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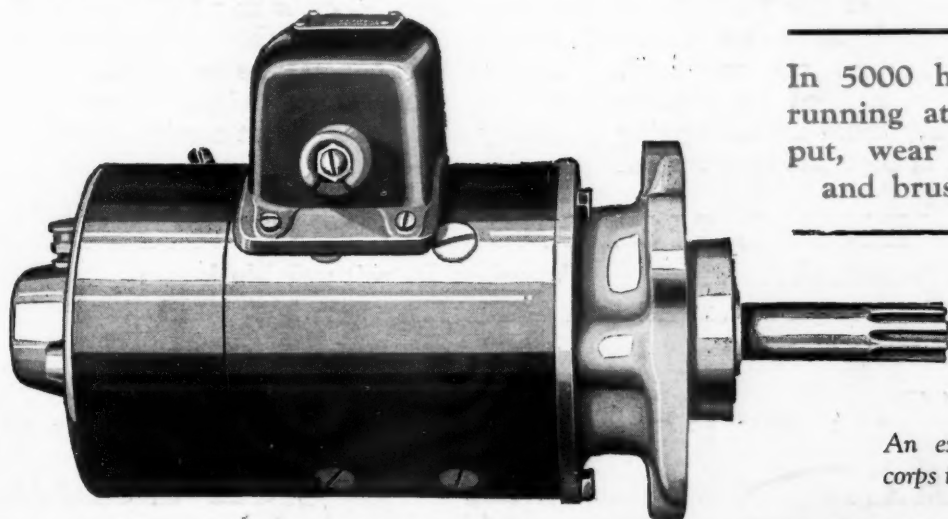
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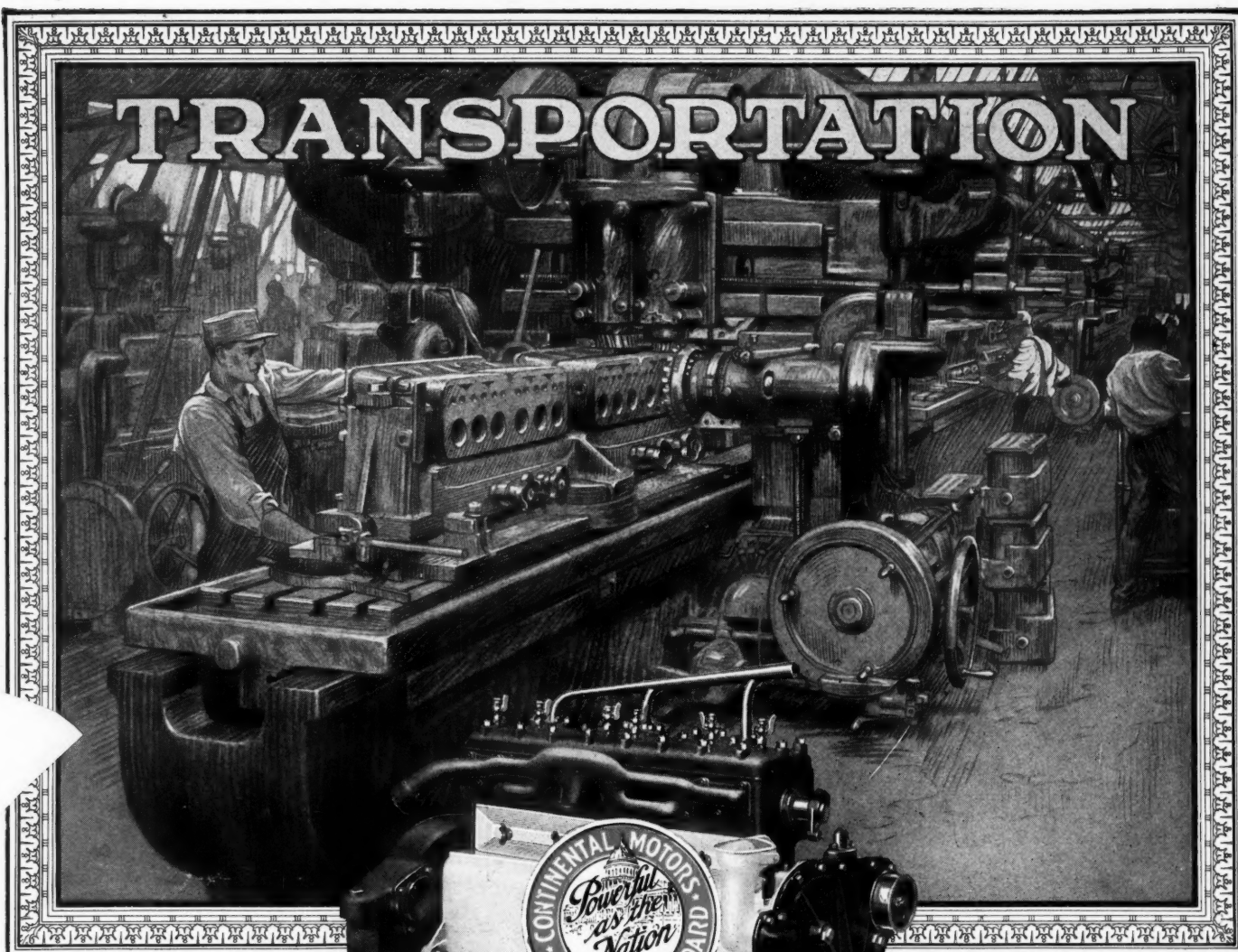
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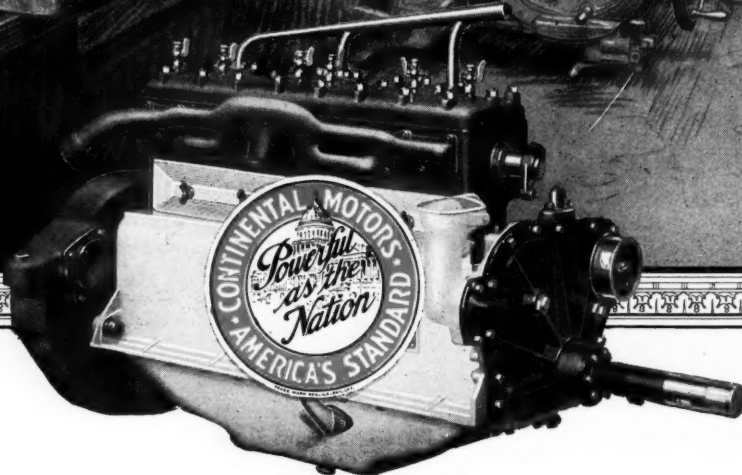
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AUTOMOTIVE INDUSTRIES

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NEW YORK—THURSDAY, FEBRUARY 3, 1921

No. 5

Optimism and Returning Business in Evidence at Chicago

Many car manufacturers give releases to parts makers. Forecast of 1921 production is 60 per cent. of 1920 figure. Early attendance at show exceeds previous records. Manufacturers and dealers discuss policies. Sales and prospects very encouraging.

By J. Edward Schipper

CHICAGO, Feb. 1.

IT would be impossible for even a conservative observer to leave the Chicago Automobile Show, which is being held at the Coliseum this week, without becoming imbued with the spirit of sane optimism which prevails among the attending manufacturers, parts and material makers and dealers. These men came here with the hope of getting business and practically all are reporting more than they expected. This spirit is reflected throughout the entire gamut of show incidents. The attendance is larger than at any previous Chicago show, running, as this is written, fully 10 per cent ahead of that of a year ago.

The sales on the floor have exceeded the most optimistic predictions and while, during the early part of the week, the larger part of the sales are the result of campaign work, conducted before the show opened, there are a considerable number of new sales. One assembled car maker in the \$2500 class reports eight sales on the floor during the first three days, three being to persons not on the prospect lists.

To properly appreciate the satisfaction with which the business being done at the show is regarded through the trade, it is necessary to realize what it

was hoped to accomplish at this show. Never has the difference between the New York and Chicago shows in this regard been brought out as strikingly as this year. Most manufacturers and others left the New York show no wiser than they went. Parts makers, as a rule, were unable to get schedules from the manufacturers and very few of the car manufacturers were able to get sufficient information from their distributing organizations to formulate a policy for the year. At the close of the New York show all eyes were turned toward Chicago, with the feeling that the show there would enable a closer estimate of the year's business.

As a consequence everybody is here. The material manufacturers are represented more strongly than ever before. Foundry, forge shops and mill men are here, as well as car distributors and makers. They came to feel the pulse of the industry, as well as to obtain actual orders. The result is that, because all branches of the industry are in attendance, it is possible to get a more tangible view of the manufacturing situation for the next three months than has been possible since the present phase of business conditions was entered.

With the exception of perhaps five of the large man-

ufacturers, who have internal conditions in the way of re-organization of finances and personnel to face or who, because of a previous period of forced production, have an unusually large stock of cars in distributors' hands, the car manufacturing schedule for the next three months will average 60 per cent of that for the same period in 1920. Releases to parts manufacturers have started and are being given on this basis. It is almost impossible to make any definite predictions because of the position of three or four of the largest producers. But gathering together all the bits of information available, a production estimate of 1,300,000 for 1921, looks conservative. While the selling wave began to spread early in January, there is no question that it has been accelerated by the Chicago show.

The enthusiasm of dealers who came here in a keenly critical frame of mind to get a line on business conditions tells the story far better than it can be put into words. A shortage of cars in the spring has been predicted and talked of by over-optimistic dealers for the past two months, but it is doubtful whether there will be any general shortage. At the same time it is very likely that certain makers who have been especially conservative in their manufacturing policy during the dull period, will confront a delayed delivery condition.

The supply of unsold cars in the country has been over, rather than underestimated. The rumor crop which has been exceptionally good during the past three months, has been responsible for exaggerated estimates of the numbers of cars on hand. One of the greatest benefits of the show is that it enables the dealers from various parts of the country to compare notes and get these stories out of their systems. It is true that four or five manufacturers have overstocked dealers but beyond this there is not much slack to take up during the time required to get into production. It requires a considerable period for a factory of any size to get back to a considerable production basis. If there is one month's normal production—or two months' present production—surplus in the country, all of it will be required to fill the gap between the present and the time the new crop of finished cars is coming through with the desired regularity.

This year the Chicago show has exceeded its record in several respects. It is always a business show, but this year there has been a spirit of determination in every branch of the industry represented here. Constructive work has been done because everyone came here determined to get business no matter how hard it was necessary to fight for it. There has been a feeling all through the industry that the ice had to be broken on the firing line; that renewed business must begin in the dealers' salesrooms. Even parts manufacturers have openly expressed the idea that it is their duty to see that the proper vigor and fighting spirit is being displayed in the salesrooms of the companies using their products. The parts makers have been brought into closer contact with the actual selling of cars than ever before by the recent practice of cancelling contracts.

The parts makers reason that if the manufacturer is going to cancel orders because sales are slow and his cars are not moving, it is no more than reasonable that he assure himself that the manufacturer is putting forth the proper effort all along the line, particularly in the selection of his dealers and their methods.

The keen interest of the dealers themselves in the future of the industry and of their own business was evidenced in the annual meeting Monday and Tuesday of the National Automobile Dealers Association, at which the relations between the dealers and factories was the principal subject of discussion. Strong feeling

regarding cancellation clauses in dealer contracts and arbitrary methods by factories has existed for some time and has been detrimental to business. The N. A. D. A., after discussing the subject, sent a communication to the National Automobile Chamber of Commerce asking that the manufacturers appoint a committee to meet with a committee of the dealers for the purpose of discussing trade practices and eliminating anything detrimental to the development of the industry. Robert J. Schmunk, vice-president and sales manager of Peerless, opened the discussion which was supplemented by a letter from C. W. Nash. Both stated that some of the industry's past practices are detrimental to business and should be corrected.

A point which must not be overlooked is the tremendous effect on general business conditions which will inevitably result from the acceleration of this great industry, which does a business of over two billion dollars a year. In fact, the general resumption in the automobile and parts plants alone will materially affect sales in the industrial territories. It is illuminating to consider the number of persons who are able to buy cars because they are in the business of making cars or parts. Sales in Michigan, Indiana and Ohio are expected to immediately result from the reopening of production.

The activities which are generally on the program for Chicago show week are in full swing. The salon at the Drake Hotel, with fourteen makers showing 43 cars, has been well attended. Despite the fact that the special bodies on these cars and the chassis shown are among the highest priced in this country and Europe, a highly satisfactory volume of business has been done.

Judged from an engineering and manufacturing standpoint, it may be said that no new cars appeared at the Chicago show. The three cars shown which are new to the general public are all assembled products incorporating units with which the industry is familiar. These new cars are the Winther Six put out by the manufacturers of the Winther truck, the Ambassador, which is a product of Shaw of Yellow Taxi fame, and the third is the Sterling Knight, of which the initial product is being exhibited at the salon and for which there are as yet no factory or manufacturing plans. The car is the design of engineer Sterling, formerly of the B. F. Stearns Co.

If the New York show had been moved bodily to the Coliseum in Chicago it would hardly have presented more similarity. In fact a great percentage of the exhibits were shipped directly to the Coliseum and Armory after the New York show. All three of the new cars are at the hotel exhibits. The Ambassador and the Sterling make up part of the salon which is being held at the new Drake Hotel and the Winther is shown at the Sherman. In connection with the salon, six of the leading body manufacturers, Fleetwood, Rubay, Graff, Smith-Springfield, Kimball and Willoughby are exhibiting their products on foreign chassis or on American chassis of the higher price class.

The new Ambassador is a high-priced product incorporating the Weidely twelve-cylinder overhead valve engine. This unit, which has been on the market for some time and which was formerly used by an Indianapolis car manufacturer, has its cylinders cast in blocks of three. It has a bore and stroke of 2 $\frac{7}{8}$ by 5 in. and develops 82 b.h.p. at 2700 r.p.m. The unit powerplant construction is used with a Brown-Lipe multiple-disk clutch and an aluminum gearset of the same make fitted with Timken roller bearings.

The axles are Timken, the rear being of the floating type. The drive to the rear axle is through a hollow propeller shaft and two Thermoid universals. Other

parts include a split-nut steering gear, 8-in. channel frame with four cross members and a rear cross plate, and chrome vanadium semi-elliptic springs. The rear springs are 58½ in. long. The wheelbase is 136 in. The electrical equipment includes Westinghouse starting and lighting motors and the new Philbrin ignition system. The car is fitted with 32 by 4½-in. tires on the roadster and four-passenger cars and with 33 by 5-in. tires on the closed models.

The Winther Six is manufactured in the plant which is also devoted to the manufacture of Winther trucks. This car is being put out by the Winther Motor Sales Corp. and is also an assembled job. It utilizes the Herschell-Spillman engine, with a bore and stroke of 3¼ by 5 in. This unit is credited with 60 hp. at 2200 r.p.m. It is a block-cast design and in the Winther car is utilized in unit powerplant form, including Warner clutch and gearset. The gear ratios in the box are 1.64 to 1 in second, 3.24 to 1 in low, and 4.05 to 1 in reverse. The reduction in the rear axle is 4 5/11 to 1.

The rear axle is a three-quarter floating, ball and roller bearing type, with spiral bevel gears. The rear wheels

are carried on ball bearings and the differential on taper rollers. The propeller shaft is hollow with metal universals at each end. The drive is Hotchkiss. A feature of the universals is the magazine oiling system which operates through centrifugal force, necessitating a filling but once in 5000 miles, according to the claims of the manufacturers.

Westinghouse electrical equipment is used for starting, lighting and ignition. The generator is mounted on the right side of the engine and the drive is taken through the waterpump shaft. The battery is a Willard of 127 amp.-hr. capacity. The battery mounting, which is under the front seat, is swung from the chassis and is independent of the body. Gasoline feed is by Stewart vacuum system to a Stromberg carbureter. The car is fitted with Velvet recoil snubbers as stock equipment. Other equipment includes a motor-driven tire pump, cowl ventilator, Motometer and a Klaxon horn. The car is being put out with a touring body and the latter is equipped with a De Luxe winter top as special or extra equipment when so ordered. The wheelbase is 120 in. and regular equipment includes 33 by 4-in. cord tires.

Detail Refinements Characterize Sizaire Berwick Chassis

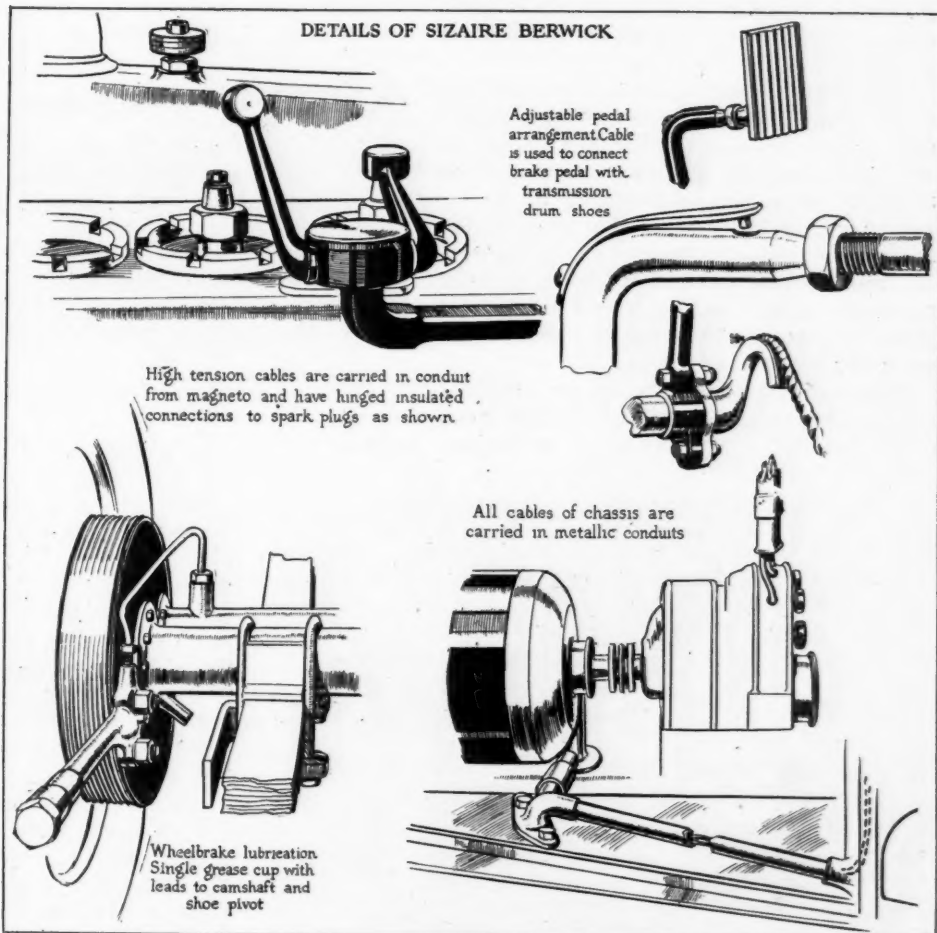
By M. W. Bourdon

THE Sizaire Berwick chassis designed by French brains and made in London differs but little from the chassis shown at Olympia in 1919. The plant in which this car is built is one of the most up-to-date in equipment in England and planned for production as well as any and better than most.

The latest chassis displays the same elaborate attention to details which characterized previous models. All wiring is inclosed in metal conduits, and even hinged insulated connections for the spark plugs are provided. The fittings on the instrument board have translucent dials with an electric light behind them. The cast aluminum dashboard is surmounted by a horizontal vacuum feed tank of 1.8 gal. capacity and other similar refinements are provided.

The four-cylinder 3¾ x 6 5/16 in. L head engine now has a pump for water circulation driven from the camshaft by a transverse shaft and located at the center of the crankcase on the right, the camshaft being on the left. The clutch is of the disk type and the amidships gearset with four speeds and right-hand control is suspended at three points from brackets attached to a subframe. From the ribbed drum of the internal expanding transmission brake the drive passes through an open tubular propeller shaft with ball-bearing star joints at each end to the spiral bevel final drive with a ratio of 4 to 1. A feature of the universal joints is that they are automatically lubricated, one from the gearset and the other from the rear axle casing.

The back axle is of the semi-floating type with self-



aligning ball bearings on the ends of the tapered extensions of the axle center. The rear semi-elliptic springs take torque and drive and are arranged immediately under the side frame members. Internal expanding brakes are used on the rear wheels, which are wire spoked.

Three Point Chassis Mounting Feature of New Speed Truck

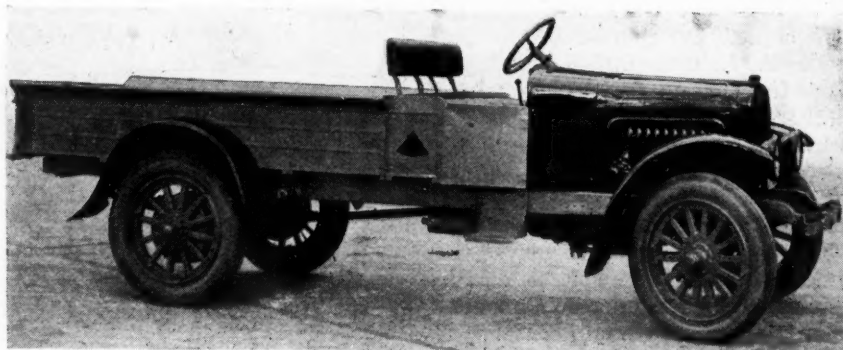
Transverse front spring with pivot joint connection to frame renders truck especially suitable for farm use or on rough roads. Midwest engine with two-bearing crankshaft and full electrical equipment is rigidly mounted on two forward points but has flexible connection with frame at rear supports. Rigid frame designed to prevent weaving of bodies.

THE outstanding feature of the $\frac{3}{4}$ -1 ton speed truck of the Service Motor Truck Co. is the three point mounting of the chassis. The truck is evidently intended for farm use to a certain extent. In such service the trucks often have to leave the highway, they must be built so as to be able to readily accommodate themselves to very uneven ground or be subjected to very severe strain. In the Service truck the plan of arranging the front spring transversely, generally followed in farm tractor practice, is adopted. There is a pivot joint between the spring and the frame at the middle, and the axle is steadied by radius rods attached by a ball joint beneath the transmission.

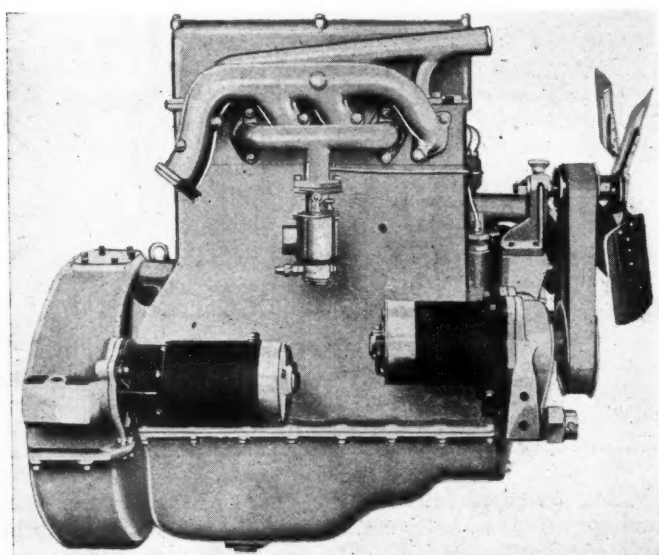
Flexibility is not confined to the running gear, but is aimed at also in the support of the unit powerplant. The latter comprises a Midwest four-cylinder $3\frac{1}{2} \times 5$ in. engine, developing 40 hp. at 1800 r.p.m., a Brown-Lipe dry plate clutch and transmission. Power is transmitted through a metal universal joint, a tubular propeller shaft, and a fabric universal joint to a model 1000 Eaton spiral bevel gear drive axle.

The engine is one of the new products of the Midwest Engine Co., and has many of the same features of construction employed in

their larger type of engine. The four cylinders are cast in a block and are integral with the upper half of the crankcase. The oil pan is of pressed steel. The removable cylinder head permits machining of the entire combustion chamber and enables clean coring of the water passages. Alloy steel valves, $1\frac{17}{32}$ in. at the throat, are used. The valve lift is $1\frac{11}{32}$ in. The rocker-arm construction is identical with that of the larger type Midwest engine. The push rods are surrounded by breather tubes, which insure oil vapor lubrica-



Service $\frac{3}{4}$ -1 ton speed truck



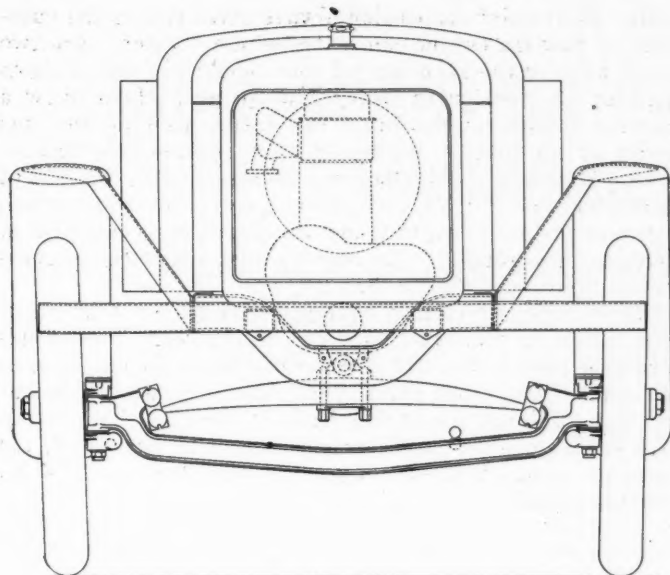
Midwest $3\frac{1}{2} \times 5$ in. truck engine with full electric equipment

tion of the rocker-arms. A tappet platform is bolted to the upper half of the crankcase.

Cast iron pistons $4\frac{1}{2}$ in. long are used. They are provided with grooves to accommodate three rings above the piston bosses. The piston pin bearing, which is $1\frac{1}{8}$ in. wide and $15\frac{1}{16}$ in. long, is located in the piston. Connecting rods are of the usual I section, $10\frac{1}{2}$ in. long, and are made of S.A.E. No. 1040 steel. These rods are belled out at the crankshaft end and the flange is carried to the center of the bearing. This construction is employed to keep the bearing round and prevent distortion when the cap is drawn up tight. Connecting rod bearings measure $2\frac{1}{2} \times 2\frac{1}{2}$ in. and the bearing cap is held on by two $\frac{1}{2}$ in. nickel steel bolts.

This model differs from the larger Midwest engines in that it has a two-bearing, counter-balanced crankshaft. Counter-weights are bolted to the shaft with nickel steel bolts, riveted over, and dowelled bushings where the counter-weights come in contact with the shaft. The front crankshaft bearing is $2\frac{1}{2} \times 2\frac{3}{4}$ in. and the rear crankshaft bearing, $2\frac{1}{2} \times 3\frac{5}{16}$ in.

The same force feed system of lubrication is employed on this model as on the larger type. The geared oil pump is of the self-priming type and has a capacity of $1\frac{7}{10}$ gal. per min. at 1000 r.p.m. Oil is drawn from the lower



Front elevation of chassis

pan, which has a capacity of $2\frac{1}{4}$ gal. A plunger controlled by the vacuum of the manifold regulates the oil flow in relation to the actual load on the engine. This allows ample lubrication for full load and prevents excess oiling at light or medium loads.

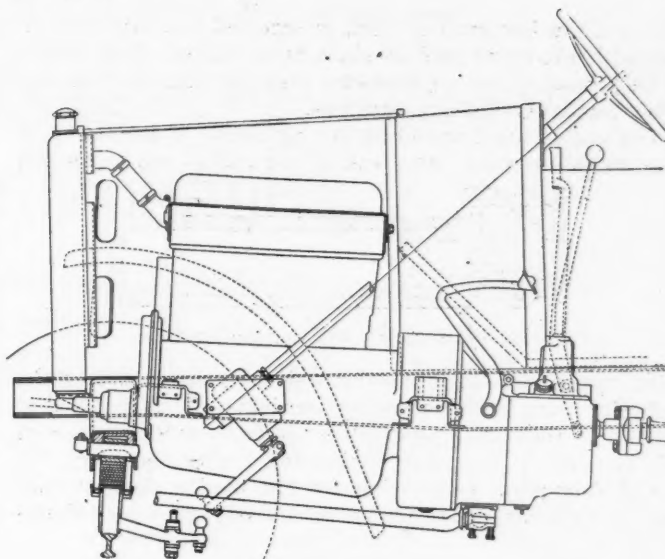
Cooling is effected by a radiator with a continuous fin and tube type core. The pressed steel radiator shell is mounted on leather pads to absorb vibration. Water is circulated by a pump having a capacity of 18 gal. per min. at 1000 r.p.m. and the air is drawn through the radiator by an 18 in. fan, driven by a 2 in. flat belt. The Remy system of battery ignition is employed, together with a Remy generator and starting motor and an Exide truck battery. A Stromberg carburetor with hot air stove attachment and choker controlled from the instrument board is used. Gasoline is carried in a 12 gal. tank in the cowl.

Power is transmitted through a single drive plate clutch and a Brown-Lipe Model 30 transmission. The clutch housing is of cast iron. The method of adjusting this clutch is somewhat different from that employed on other Brown-Lipe clutches. A nut of malleable iron, which moves mild steel plugs in and out, is provided. These plugs change the relative position of the toggle levers, which are hardened forgings, and they, in turn, regulate the pressure on the pressure plate. The pressure plate is cast iron and the driven disks are pressed steel, ground on both sides. The clutch facings are of moulded Raybestos, $10 \times \frac{1}{8}$ in. The clutch shaft is of low carbon, $3\frac{1}{2}$ per cent nickel steel, and of $1\frac{1}{2}$ in. diameter. Whereas radial and thrust bearings are used in most Brown-Lipe clutches, this clutch is provided with a straight thrust bearing. The transmission is provided with speedometer drive at the rear.

A $2\frac{1}{2}$ in. tubular propeller shaft is used, with a Merchant & Evans universal joint at the front and a No. 2206 Goodrich fabric joint at the rear. The latter provides a cushioning member between axle and transmission.

The front axle is of the reverse Elliott type, drop forged of alloy steel, heat treated. This axle is specially designed to accommodate the front cross spring. The axle center is $2\frac{1}{2}$ in. deep, $1\frac{3}{8}$ in. wide and has a $\frac{3}{8}$ in. web. The front spindles are $1\frac{1}{2}$ in. in diameter and are fitted with taper roller bearings. The rear axle is designed for the Hotchkiss drive but can be equipped with radius rods if desired. Optional gear ratios are $5\frac{1}{8}$, $5\frac{5}{8}$ and $6\frac{1}{7}:1$.

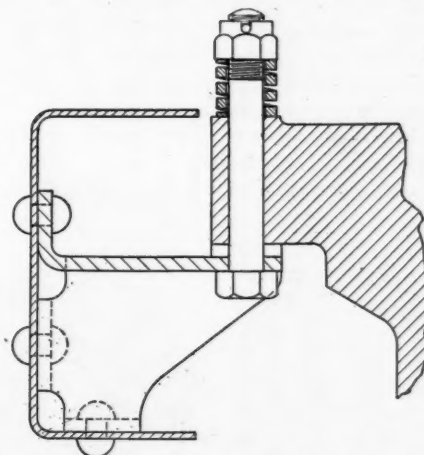
Cam actuated internal brakes act upon brake drums $15\frac{3}{4}$ in. in diameter. The width of the brake shoes is



Elevation of forward part of chassis, showing trunnion support of frame and location of radius rods

$1\frac{3}{4}$ in. Both brakes are placed inside the frame to avoid interference with skid chains. The lug at the rear of the brake bands is provided with a slot which permits the brake band to center itself when the brakes are applied. This results in more even wear on the band.

The steering gear is of the worm and sector type and is of Service design and manufacture. A small metal stamping covers the joint between knuckle pin and steering head and aids in excluding dirt. Left hand drive and center control are provided, the gear shift and emergency brake levers being mounted on the transmission. The spark and throttle are controlled by levers under the steering wheel and the throttle is also under the control of a foot accelerator. The pedal of the accelerator is so designed as to eliminate continual opening and closing of the throttle when the car is being driven over rough roads.



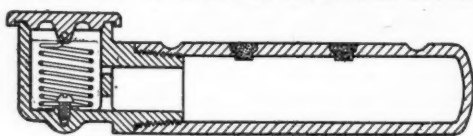
Flexible rear engine support

The frame is made of pressed steel, the channel section being $5\frac{7}{8} \times 3 \times \frac{1}{8}$ in. between dash and rear spring front hanger, tapering to $3\frac{3}{4} \times 2$ in. at the rear end and $3\frac{7}{8} \times 2$ in. at the front end. The length of the frame back of the driver's seat is 101.5 in., the width $30\frac{3}{4}$ in. at the front and $37\frac{3}{16}$ in. at the rear.

The front cross spring is 38 in. long, $2\frac{1}{2}$ in. wide and has nine leaves of a total thickness of $2\frac{21}{32}$ in. The spring eyes are bronze bushed for $1\frac{1}{4}$ in. shackle bolts. This spring is shackled at both ends of the front axle and is trunnioned at the center. The shackle bolt, which is

drawn from low carbon steel, is screwed to a die cast oil cap with the cover held in place by a spring. Two pieces of felt about $\frac{3}{8}$ in. in diameter transfer the oil from the reservoir to the bearing surfaces.

The use of the front cross spring makes it necessary to provide radius rods. One end of the radius rod has a ball



Section of shackle bolts and oil reservoir

joint at the bottom of the transmission, the socket of the ball joint being held in place by four bolts. The front end of the radius rods has a taper fit in the front axle. The use of this type of front spring suspension makes necessary the use of four-point suspension for the engine, but permits the use of a very rigid frame, which is particularly desir-

able. Four-point suspension always gives rise to the question of how the engine can be bolted down tight. The two bolts holding the rear legs of this engine are bolted down against the tension of heavy coil springs, which allow a certain amount of flexibility and insure keeping the legs tight at all times. It is said that considerable trouble (with bodies in particular) has been caused by the use of a flexible type of frame, and this type of suspension, which permits the use of rigid frame construction, is intended to obviate this trouble. The rear springs are of the conventional type, semi-elliptic, 50 x 2½ in.

This truck is regularly equipped with 34 x 4½ in. pneumatic tires in front and 35 x 5 in. in the rear. The standard gear ratio is 5⅝ to 1 and permits of a speed as high as 40 m.p.h. The truck chassis, provided with a cushion but no seat, is to sell for \$1,840, f.o.b. at factory. Two standard bodies, one open and one closed, can be purchased, the weights being about 600 lb. for the open body and 700 lb. for the closed.

Winch Attachment for Tractors

THE range of utility of the 5 ton and 10 ton caterpillar tractor manufactured by the Holt Manufacturing Co. has been increased by providing for use on the tractors a winch attachment as shown in the accompanying cut.

Caterpillar type tractors are extensively used in the logging industry as well as in the oil fields. The winch attachment facilitates skidding logs out of relatively inaccessible places, and is useful in pulling and running back tubing and rods used in oil wells.

The Holt winch is operated independently of the driving mechanism of the tractor. The drive is from the rear of the transmission-case by propeller-shaft and gear-train to internal gear planetary and final bevel gears. A clutch of ample size to permit slipping indefinitely is provided. The standard pulling speed of the 5 ton winch is 108 and 252 ft. per min. on low and high gear respectively, and the corresponding pulls are 10,400 and 4450 lbs. Maximum reverse speed is 583 ft. on low and 1360 ft. on high gear. Other speeds are obtained by slipping the clutch. Two other sets of gear ratios are provided at option.

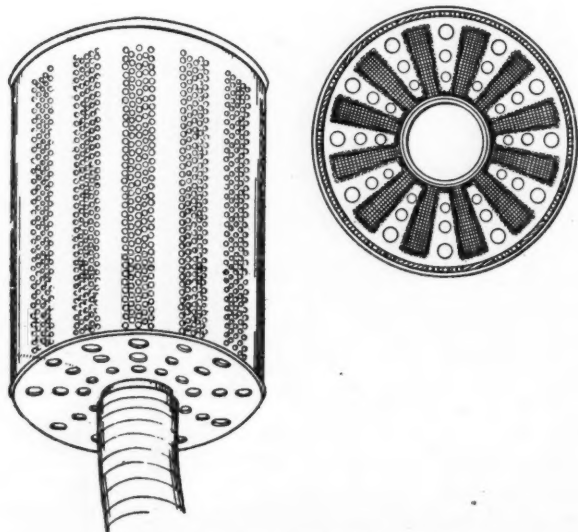
The winding drum is 8 in. diameter and 13 in. between flanges, and has a capacity of 1300 ft. of ½ in., 850 ft. of ⅝ in., or 590 ft. of ¾ in. cable.

All shafts and gears are nickel or carbon steel, the gears



Winch attachment applied to Holt tractor

being case hardened. Ball or roller bearings are used throughout and the gears and moving parts are enclosed.



An air filter for trucks and tractors

A Self-Cleaning Air Filter

AN air cleaner in which felt is used as a filtering medium has recently been placed on the market by the Staynew Filter Co. As will be seen from the accompanying cut the device consists of a cylindrical, perforated shell, into which is fitted an elongated spider formed of wire screen and covered with felt. The central portion of the spider communicates with a central tube, through which the clean air entering the carburetor flows. The felt-covered surface spider is said to have an area of over 500 sq. in. The area of the inlet holes being large, the entering velocity of the air is low and consequently the larger particles of dust are allowed to settle out before the air passes through the felt. It is claimed that the air entering the cleaner does not strike directly upon the filtering material and that the dust which collects on the surface of the felt is shaken off by the vibration of the vehicle on which the cleaner is used. The dust shaken loose drops out of the shell through holes in the base.

Instrument for Measuring Engine Clearance Volumes

Makes use of principle which provides that a simultaneous decrease of known amount in two volumes will produce the same pressure change only when both volumes are equal and the leakage is the same.

By S. W. Sparrow*

A FEW years ago, when the gasoline engine with vertical cylinders was the well-nigh universal type, a description of apparatus to measure clearance volume would have aroused little interest. In the highest part of such cylinders there was usually located either a valve or a spark plug through the opening for which liquid could be poured. The volume of liquid required to fill completely the combustion space with the piston at the upper dead center served as the clearance measurement. To be sure, it was a rather messy procedure requiring considerable time to remove the liquid when check readings were desired, but otherwise was fairly satisfactory. With the advent of the V-type engine, the problem ceased to be simple. Frequently it was almost impossible to make this measurement with the engine mounted for test, as all openings were then below the highest point in the cylinder.

In the summer of 1919, Major Norman of the English Royal Aircraft Establishment at Farnborough suggested making this measurement by a process which consisted essentially of simultaneously changing both a known and an unknown volume of gas by a known amount and then calculating the magnitude of the unknown from the resulting difference in pressure between the two. To Dr. Dickinson, who was in Europe studying aviation development, the idea made instant appeal, and on his return to the Bureau of Standards he started the construction of an instrument based on this principle.

The principle of the apparatus is shown in Fig. 1. If the volumes *a* and *b* are both decreased the same amount by the movement of the pistons, there will be a pressure increase in each cylinder, the greater increase occurring in the smaller volume. The pressure difference will be indicated by the difference in liquid level in the U tube connecting the two cylinders. In practice, volume *a*, the clearance volume, is always unknown, while in the other, volume *b*, can be altered by moving piston *c* in or out of the measuring cylinder and its magnitude read from the scale on the piston stem. This calibrated volume is changed

until the movement of the two companion pistons produces the same pressure increase in both cylinders as indicated by the liquid in the U tube remaining level. Both volumes are then equal. The above statements hold true only if both cylinders are airtight or if both leak at the same rate. Since the engine cylinder is never strictly tight, an adjustable opening is provided to permit an equal rate of leakage from the comparison cylinder. For clearness, the simultaneous volume changes are described as taking place in the clearance and measuring volumes, whereas actually there are auxiliary volumes *d*₁ and *d*₂, connected with these in which the actual change is made, so that it is (clearance volume + auxiliary volume *d*₁) and (measuring volume + auxiliary volume *d*₂) that are changed. The addition of

these auxiliary volumes simplifies the apparatus for making the volume changes, and inasmuch as both are equal, does not alter the relations described above.

The actual instrument is shown in diagram in Fig. 2, in section in Fig. 3, and in the photograph, Fig. 4. For producing the changes in volumes, the pistons, shown in the diagram, have been replaced by the cylindrical copper bellows, *A*. Changes in the comparison volume are produced by turning hand wheel *C*, the motion being transmitted to the piston *B* through a gear and rack. A vernier and graduated scale on the piston stem permit the

direct reading of volumes up to 48 cubic inches in steps of one-tenth of a cubic inch. Should it ever be necessary to measure larger volumes, an auxiliary cylinder can be connected to Tee *D*, now closed by a pipe plug. The measurement would then be made as before, except that to the reading on the piston stem should be added the volume of the auxiliary cylinder. Tank *E* is a check volume of 7 cu. in., used only for calibration purposes. When the tubing is renewed, fitting *F* is screwed into the tank, screw *G* loosened, and vernier *H* adjusted to read exactly 7.

Measuring clearance volumes consists of three distinct steps:

1. Measuring the rate of leakage from the engine cylinder.
2. Making the rate of leakage from the comparison volume equal to that from the engine cylinder.

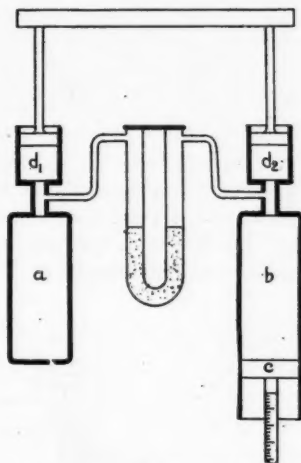


Fig. 1—Diagram illustrating principle of apparatus

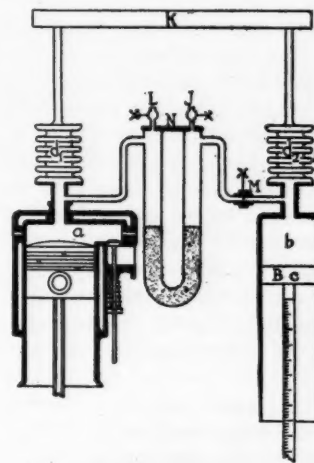


Fig. 2—Diagram of actual instrument illustrated in the photograph

*Automotive Power Plants Section, Bureau of Standards. Condensed from N. A. C. A. Technical Note No. 27.

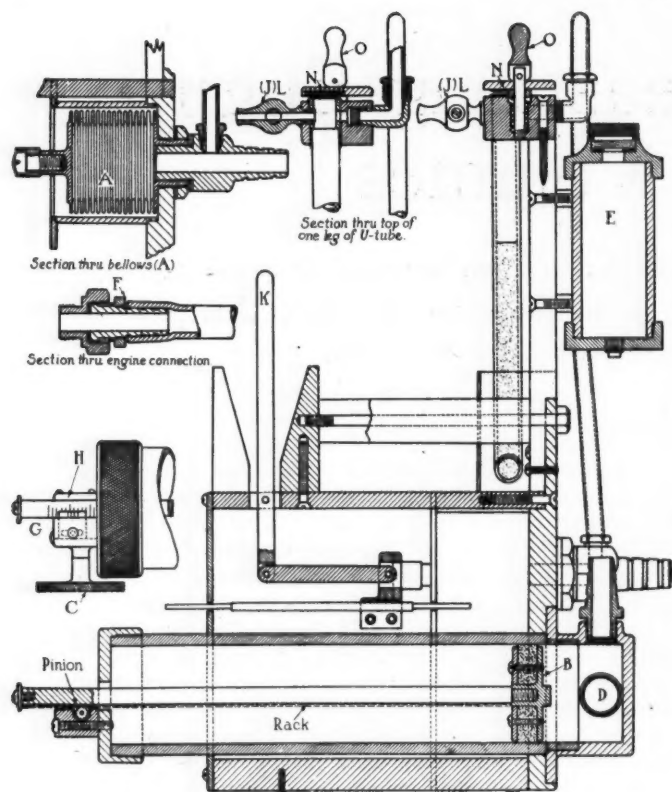


Fig. 3—Sectional view of instrument, showing details of construction

3. Equalizing the comparison volume with the clearance volume.

In measuring the rate of leakage from the engine cylinder, after having latched cover plate *N*, needle valve *J* is opened, leaving the right side of the U tube open to the atmosphere. Lever *K* is then pulled back until a considerable pressure difference is produced. The leakage rate is estimated by noting the approximate time required for the pressure to decrease a definite amount. Valve *L* is next opened and *J* closed, one side of the U tube now being open to the atmosphere and the other connected to the comparison volume. Valve *M* is then adjusted until the leakage rate is approximately the same as that from the engine cylinder.

In equalizing the volumes, valves *J* and *L* are both closed, the left leg of the U tube then being connected to the engine cylinder and the right leg to the measuring cylinder. When changing the volumes by means of lever *K*, it is most convenient to watch but one leg of the tube. If the left leg be the one chosen and the initial movement of the liquid is downward, it indicates the pressure in the engine cylinder to be the greater and its volume to be the smaller. After relieving the pressure on both sides by raising cover plate *N*, the volume in the measuring cylinder should be decreased. The cover plate is again lowered and secured tightly with latch *O* and the process repeated. The correct volume is that with which there is no change in liquid level noted at the first application of the pressure.

It will frequently be found that with the volumes well equalized, after the pressure has been maintained for a second or two, the deflection of the liquid in the U tube will increase, showing that the leakage rates have not been perfectly balanced. A few trials will readily convince the operator that it is the initial movement that should be considered in adjusting the comparison volume, and that extreme care in balancing leakage is unnecessary. The explanation will be evident from a consideration of the effect of a difference as large as 10 per cent in the leakage rate

from the two volumes. For this purpose, let the rate be assumed as 0.03 cu. in. per second, a rather high value for the small pressure increase produced with this instrument. With the above assumption, a measurement taken at the end of one second will be in error by the difference in the amounts that have leaked from the two volumes, namely, $0.03 - 0.9 (0.03) = 0.003$ cu. in. The sensitivity of the instrument, however, is about 1 per cent, a difference between the comparison volume and the measured volume of this amount being required to produce a readable deflection on the manometer. The 0.003 cu. in. error will therefore be too small to be noticed in measuring volumes of the magnitude of engine clearance spaces. The initial manometer deflection observed can therefore be attributed entirely to the difference in the magnitude of the two volumes.

In using this apparatus, care must be taken to prevent temperature changes in either volume, as a change of 3 deg. C. will change the deflection a noticeable amount, and hence vitiate the result. Obviously, such measurements should never be attempted immediately after operating the engine, before it has cooled to normal temperature.

To attempt precise measurements of a clearance volume without first carefully setting the piston at dead center would be utter folly. Markings on flywheel or propeller hub make this a matter of comparative ease in the majority of cases. In the absence of such markings, the clearance measuring apparatus may be connected as was done for measuring leakage with valve *J* open and *L* closed. This merely enables the U tube on the instrument to be used to measure the difference between the pressure in the cylinder and the atmosphere. Moving the piston toward upper dead center produces pressure; moving it away, suction. In the Liberty "12" one degree motion of the crank from dead center can be detected with this instrument.

THE engineer of a large automotive engine manufacturer states that his company is concentrating all its efforts in fuel study on improving vaporization by applying the hot-spot principle, believing it to be the most logical method adaptable to present-day types of engines.

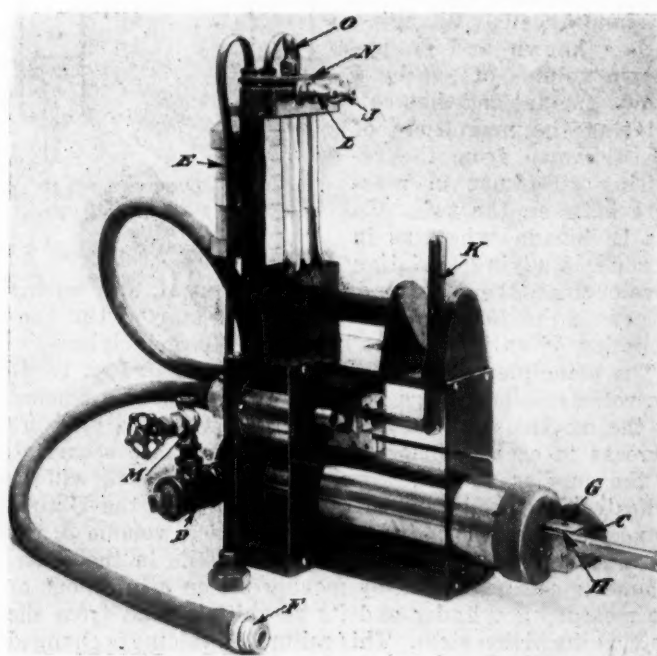


Fig. 4—Instrument developed by the Bureau of Standards for measuring clearance volumes

Two Recent French Pursuit and Racing Planes

Borel machines are both biplanes and use 300 hp. Hispano-Suiza engines. The pursuit machine has good streamline nose, clear vision, and carries radiators under fuselage. Fuel tanks can be instantly released in case of fire. Racing plane first seen in Gordon-Bennett trials.

By John Jay Ide

THE Société Anonyme des Aéroplanes Borel has recently produced a pursuit type airplane which can be used either as a one or a two-seater. It is noteworthy for the good streamline form of the nose, a relatively short fuselage, a stabilizer adjustable on the ground, long narrow ailerons on the lower wing only and wings staggered forward.

There are two bays in the biplane wing structure cross-braced by streamline wire. The lower plane has no dihedral but the upper plane has a dihedral of 2 deg. The angle of incidence of both planes is 2° 30'. The forward stagger is 15 in. The leading edges of the wings are covered with three-ply and the trailing edges are composed of steel wires. Both interplane struts and wing spars are of spruce. The factor of safety of the cellule is 7 for normal loading and 3.5 for top loading.

The balanced ailerons are operated by duralumin tubes, the control wires of which are doubled. The comfort of the pilot was considered in making adjustable not only the height of the seat but also the position of the rudder bar with reference to the seat. A stream of hot water taken from the carbureter heater runs through the rudder bar.

The upper plane is at the height of the pilot's eyes and the straight line from the pilot's eyes to the leading edge of the lower plane is at an angle of 18 deg. with the vertical. The vision straight forward is excellent due to the absence of a nose radiator. Cut out portions of the lower wing permit the pilot to see vertically downward. Cooling is by two Lamblin radiators placed under the fuselage. The latter is designed for a factor of safety of 5.5. The longerons are of ash and spruce con-

nected by spruce struts and cross braced with piano wire.

The landing gear struts are of reinforced streamline tubing; the axles are also streamlined. A pivoted ash skid is attached to the stern of the fuselage.

The 300 hp. Hispano-Suiza engine rests on walnut bearers with leather between the bearers and the engine. The two bearers are held in place by metal braces. There are large inspection doors for the carbureter, magnetos, Odier self-starter and plugs.

The two tanks which can be released instantly in case of fire hold sufficient fuel for 2½ hr. flight at full speed at ground level. There is a gravity tank in the upper wing.

The radiators installed under the fuselage are quickly demountable. A filter is placed in the water circulation system. The gravity water tank is in the leading edge of the cabane joining the fuselage and the upper wing.

There are two Vickers machine guns with 1600 cartridges firing forward and two Lewis guns aft, mounted on a ring. The installation of a gun firing downward has been provided for, it being necessary merely to remove a three-ply cover. When the aeroplane is used as a single seater the ring mount is turned and clamped so that the two Lewis guns fire over the upper plane and propeller parallel to the longitudinal axis of the machine.

Provision has been made for two cameras behind the pilot's seat. Parachutes are placed in a case behind the gunner.

The service ceiling is 25,900 ft. and the absolute ceiling 27,100 ft.

The new Borel racing airplane made its first appearance at the French elimination races for the Gordon Bennett Cup last September. Although possessed of very great speed it did not qualify as it was overturned and somewhat damaged in making a landing.

The biplane cellule is noteworthy for the small chord (36 in.) of the planes. The supporting area is increased by a small plane covering the axle of the landing gear. The single strut on each side of the fuselage is forked.

Streamline wiring is used, the attachments at the lower ends of the wires being hidden in the wing.

There are ailerons on the upper wing only. Their area is very great relative to



Borel pursuit airplane (300-hp. Hispano-Suiza engine) can be used either as single or two seater

the area of the wing. The fin is of very small size but the rudder is quite large (16 x 32 in.).

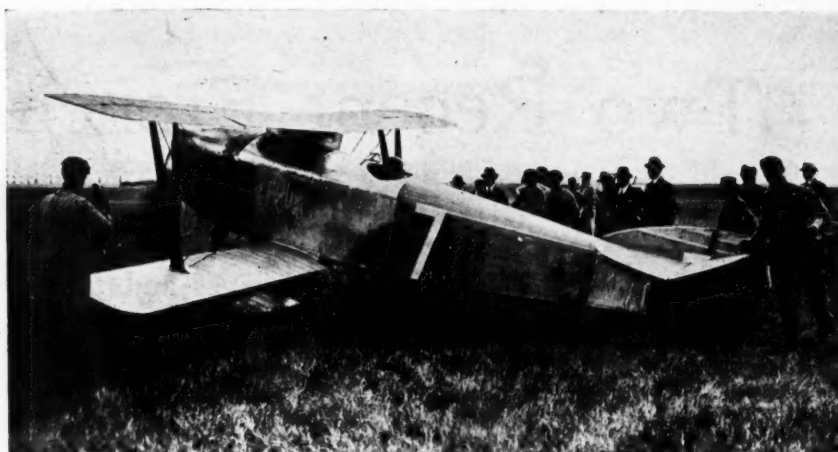
The wing area is 140 sq. ft. and the total weight 1936 lbs. The load per sq. ft. is 13.8 lbs. and per hp. 6.4 lbs.

A 300-hp. Hispano-Suiza engine is used cooled by two Lamblin radiators.

The general specifications of the Borel pursuit machine are as follows:

Span	37.4 ft.
Length	23.3 ft.
Height	8.7 ft.
Chord	5.2 ft.
Wing area.....	355 sq. ft.
Area of elevator.....	16.5 sq. ft.
Area of stabilizer.....	18.8 sq. ft.
Area of rudder.....	9.7 sq. ft.
Area of fin.....	5.4 sq. ft.
Weight, empty.....	1798 lbs.
Useful load (2 seater) ..	1095 lbs.
Total weight	2893 lbs.
Load per sq. ft.	8.1 lbs.
Load per hp.	9.6 lbs.
Engine.....	300 hp. Hispano-Suiza

The official performances as a two-seater are:



Borel racing airplane (300-hp. Hispano-Suiza engine) used in Gordon Bennett cup elimination race

Feet	Time of Climb	Speed (m.p.h.)
3,280.....	2 min. 47 sec.	....
6,560.....	6 min. 0 sec.	143.6
9,840.....	9 min. 34 sec.	139.8
13,220.....	13 min. 49 sec.	134.9
16,440.....	19 min. 31 sec.	128.6
19,680.....	26 min. 53 sec.	120.6
21,320.....	33 min. 33 sec.	115.6

The De Pischoff "Avionette"

By John Jay Ide

THE De Pischoff "Avionette" is the smallest serious flying machine in France, if not in the world. To prove that it is not a mere toy one has only to point to its performances at the recent Buc Aviation Meet, where among other achievements it climbed to a height of over 2500 ft.

The "Avionette" is a biplane with tail booms and wing structure entirely of metal. The axle of the landing gear is mounted on the front spar of the lower wing, which is only 8 in. from the ground. The interplane struts are of the I type and the fuselage is replaced by a couple of booms carrying the customary tail surfaces. The ailerons are on the upper wing only.

The engine is a 16-hp. two-cylinder horizontally opposed Clerget-Blin. Immediately behind it sits the pilot, of whose anatomy it must be admitted a considerable portion is exposed.

By folding the wings and hinging the tail the dimensions of the machine can be considerably reduced for storage purposes.

The characteristics of the "Avionette" are:

Span	17 ft.
Length	11.5 ft.
Height	4.2 ft.
Wheel track	2.6 ft.
Wing area	81 sq. ft.
Weight, empty	225 lb.
Useful load	176 lb.
Total weight	401 lb.
Speed	59 m.p.h.
Duration	2 hr.
Getting-off run	130-160 ft.
Landing run	65-80 ft.
Factor of safety.....	5



The De Pischoff Avionette

To Assemble American Parts in Spain

A COMPANY called the Sociedad Española de Automóviles Landa has been organized in Madrid, and has put on the market a four-cylinder car, which is considered to embody all the features necessary to capture the Spanish market. Spain does not at present possess the elements indispensable for the practical construction of cars in all stages, and the Landa company does not actually manufacture the constituent parts of its cars in Spain, but has devoted its whole energy and capital to the organization of a model finishing and assembling establishment.

The Landa chassis are built in Spain with American material, but they are claimed to unite all the good qualities of the most modern type of car. The motor has $3\frac{3}{8}$ x 5-in. cylinders. It is said only to consume 12 litres of fuel per 100 kiloms. (5.08 gal. per 100 miles), and to give the car a speed approaching 100 kiloms. per hour. The cars are fitted with the Zenith carbureters and the Westinghouse electrical equipment. A number of chassis are now being built by the company, while the materials for 200 more are on the way, and it is hoped ultimately to turn out 1000 cars yearly.

Researches on Alcohol as a Fuel for Internal Combustion Engines

The object of investigator was to secure basic data on the vapor pressure, ignition temperature, movement of flame through explosive mixtures and the detonation of the vapor of alcohol, gasoline, benzol and various mixtures of two of these fuels. The results are worthy of careful study by those interested in combustion and related phenomena.

By Harold B. Dixon*

THE object of these researches was to obtain data for comparing alcohol with gasoline and other hydrocarbons as a fuel for motor and other small engines, and to determine how far the properties of alcohol are modified by admixture with other volatile liquids. I undertook to make experiments on the burning of alcohol and other vapors on the same lines that had been followed with permanent gases—especially on the ignition of the mixtures and on the movements of the flame in explosions. The work is by no means finished, and I propose to continue and present a more complete report later on.

One further word of introduction must be said. It has been argued—and probably most people agree with the reasons urged—(1) that if the increasing use of motor engines is to be maintained, some fuel must be found to reinforce the world's supply of gasoline; and (2) that of the possible fuels "in sight" which have the desired physical properties, ethyl alcohol alone seems capable of being produced in quantity sufficient to meet the demands of the future. In assenting to these conclusions, there is no question of sounding any alarmist note against the use and efficiency of gasoline, which the world will continue to demand in increasing quantities. We are merely recognizing the fact that the deposits of mineral oil are limited and cannot be reproduced, while the potential supply of alcohol is only limited by our power to produce fermentable sugar through the sun's energy. There is the question of husbanding the world's resources of gasoline, and if power alcohol will help to that end—as I believe it will—it is our duty and our advantage to give it fair trial.

Germany, with characteristic prescience, began more than twenty years ago to foster the use of alcohol, which (with certain additions) has been her standard motor fuel since 1904.

The Vapor-Pressures of Alcohol and of Alcohol Mixtures

On comparing alcohol with other liquid fuels, we find certain properties which affect its use, such as its small vapor pressure at low temperatures, its high latent heat of vaporization, its attraction for and its miscibility with water. For instance, air bubbling through liquid alcohol does not form an explosive mixture, for the vapor carried by the air is too small; but air bubbled through pentane or hexane, through benzol or through ether in each case forms a combustible mixture with too much vapor in it to explode. Alcohol must be heated to give off enough

vapor to form an explosive mixture with air; the other mixtures must be diluted with more air to bring them within the explosion limits. Hence the difficulty with an ordinary gasoline engine starting cold with alcohol. There are several ways of surmounting or avoiding the difficulty. If the engine is designed to burn alcohol—using a long stroke and a high compression—the cylinder may be flooded (either directly or through the throttle valve) with a little liquid alcohol in the form of spray, which is warmed by compressing the air in the cylinder. Crossley Bros. are running one of their 4¼-in. x 6-in. 5 hp. single-cylinder engines arranged to give a compression ratio of rather over 8 to 1. With either method of flooding there is no difficulty in starting cold with ordinary industrial alcohol. Running at full load and 500 r.p.m., the engine was remarkably silent. The spray from the exhaust, thrown out while the condenser was cool, was found to be slightly acid, though no evil effects of acid could be found on the exhaust or throttle valve, or on the cast iron piston, after a fortnight's running.

Those who wish to avoid the starting difficulty will look to some mixture of alcohol with other liquid which will readily form an explosive gas with air in the cold. As a guide in making such mixtures, the vapor-pressures of pure alcohol, pure pentane, pure hexane and of various mixtures have been determined, with the results shown in the appended table. It is remarkable that, while the vapor-pressures of pentane, hexane, and ether are lowered by admixture with alcohol (as is usual with miscible liquids), the vapor-pressure of the benzol mixture is above that of either of its constituents. When cold air is bubbled through a 20 per cent benzol-80 per cent alcohol mixture the resulting stream of vapor and air is highly explosive. This mixture has been tested in automotive engines, and no difficulty has been found in starting up cold. With the single-cylinder kerosene engine of Crossley Bros. the volume of liquid fuel consumed per b.-hp. was about 3 per cent less with the 20 per cent benzol mixture than with industrial alcohol alone.

Vapor Pressures of Liquid Fuels in Mm. of Mercury

Temp. C. F.	Ether.	Natalite. Ether 45. Alc. 55%	20% Et. 80% Al.	Alcohol.	20% Hex. 80% Al.	Hexane.	20% Ben 80% Al.	Benzol
0 32	180	165	73	14	30	44	37	28
10 50	250	250	105	22	46	76	56	45
20 68	433	380	162	42	80	121	90	75
30 86	637	547	247	79	141	184	142	120
40 104	..	..	350	135	219	276	215	180
50 122	..	..	500	217	328	400	325	263

*Professor of chemistry in the University of Manchester. This paper was presented before the Imperial Motor Transport Council.

The difference shown by the benzol-alcohol mixture is no doubt due to the small attraction between the two liquids. The addition of water to the mixture diminishes the attraction, and a dilution is soon reached when the liquid separates into two layers, the denser watery liquid below containing less benzol and the lighter liquid above containing more benzol than the original mixture. Also as the temperature falls the solubility of benzol in alcohol diminishes. The higher the percentage of alcohol in the mixture the more water is required to separate the mixture into two liquid layers.

Similar experiments made with alcohol-hexane mixtures showed that the addition of water caused a separation at lower temperatures than with the corresponding alcohol-benzol mixtures. For instance, with equal volumes of alcohol and hexane, it requires the addition of only 7 per cent of water to separate the liquids at 63 deg. Fahr., whereas the same water added to equal volumes of alcohol and benzol required the whole to be cooled below the freezing point (29 deg. Fahr.) before producing separation. For these reasons I have mainly worked with alcohol mixtures containing between 20 and 30 per cent by volume of benzol.

Owing to the heat of evaporation of liquid alcohol being greater than that of gasoline or benzol it is important to warm the intake when using alcohol mixtures. This can be conveniently done by passing all or a part of the exhaust gases round the intake.

The Ignition Temperatures of Alcohol and Other Vapors

Two methods were used for the determination of the ignition temperature of alcohol vapor, and in each case comparison experiments were made with other vapors. Both methods had previously been used for determining the ignition temperatures of permanent gases, and the chief alterations required in the apparatus were means of keeping the stored mixtures, the connecting tubes, and the ignition vessel itself above the condensation point of the vapors, and the substitution by glass, silica, or metal joints of all rubber connections which would have been acted on by the vapors.

Ignition by Heating at Atmospheric Pressure

In the first method, the vapor and the air or oxygen were heated separately by passing them upward through two concentric tubes fitted into a long electric furnace, the temperature of which could be slowly raised and accurately measured. The vapor passing up the narrow inner tube issued at a jet with a sufficient stream to carry the combustible gas rapidly away from the solid silica surrounding the orifice, but not so quickly as to cause the resultant mixture of combustible vapor, containing oxygen or air, to come into contact with the heated wall of the large outer tube before the flame appeared.

The catalytic effect of a heated solid on the ignition of the permanent gases had been already noticed. All combustible gases and vapors when heated with oxygen undergo a "pre-flame combustion," which at the ignition point becomes rapid enough to heat up the gases automatically until the flame appears. Solids affect this pre-flame combustion in two ways: They increase the rate of combination, thereby generally lowering the ignition temperature, but when the flow of combustible gas is very slow the solid may start the pre-flame combustion, but, by conducting away the heat, may prevent the automatic heating-up—so that no flame appears though the orifice of the tube is visibly red-hot. It was necessary to determine by experiment when the rate of flow through the jet and when variations in the diameter of the outer tube ceased to affect the ignition temperatures.

In the case of the vapors now experimented with, the

pre-flame combustion is much more marked than with such gases as hydrogen and cyanogen. All the vapors underwent pre-flame combustion as they mixed with the oxygen and passed along the wall of the outer tube, so that the gases would often burst into flame near the upper end of the furnace, and fire back some seconds after the vapor had issued from the jet. This contact action with the wall was particularly noticeable with ether. To overcome this difficulty, two methods were tried: (1) by increasing the air-stream to render the mixture non-inflammable (by dilution) before it reached the wall; (2) by making the flow of vapor from the jet intermittent and timing the inflammation. A combination of these methods was finally adopted; a wider outer tube was used, to increase the relative quantity of air, and the flow of vapor could be started at any moment. When the vapor ignited within a half-second of its issue from the orifice, the temperature of the tube was taken as the ignition temperature.

The ignition temperatures of alcohol vapor coming into contact with oxygen or air heated to the same temperature were fairly definite; those of pentane vapor moderately so. It is noticeable that pentane ignited at nearly the same temperature, whether the vapor came into contact with pure oxygen or air, whereas alcohol ignited at lower temperatures in oxygen. Ether presented a quite abnormal property; when all contact with solids was avoided ether fired below 240 deg. C. (464 deg. Fahr.) in oxygen, but had to be heated to nearly 580 deg. C. (1076 deg. Fahr.) before it would inflame immediately in air. When ether vapor and air are allowed to flow along a tube and are in contact with the heated walls, the mixture gradually heats up, and the ignition temperature, as measured by the temperature of the tube, is quite indefinite.

Ignition Temperature of Vapors Heated Prior to Admixture with Air or Oxygen Heated to Same Temperature

	With Oxygen		With Air	
	Cent.	Fahr.	Cent.	Fahr.
Alcohol.....	510 to 515	950 to 959	595 to 600	1103 to 1112
Pentane.....	550	1022	560 to 570	1040 to 1058
Ether.....	235 to 240	455 to 464	560 to 580	1040 to 1076

The second method of determining the ignition temperatures of alcohol and other vapors was to compress mixtures of the vapor with air or oxygen in a steel cylinder by means of a falling weight driving in an air-tight piston. This method had been carried out successfully with many of the permanent gases, and can be used for the vapors of volatile liquids, providing the reservoir containing the mixtures and the cylinder itself are maintained at a sufficiently high temperature. In most of the experiments the cylinder was kept at 50 deg. C. (122 deg. Fahr.) by a water jacket, in which the hot water was well stirred. In some experiments a temperature of 140 to 158 deg. Fahr. was used, and in a few 212 deg. Fahr.

The rise of temperature produced in the mass of the gas by the sudden compression is nearly independent of the wall surface, which, of course, cools by contact the layer of gas next to it, and, so far as it acts, lowers the pressure. There is no evidence that the steel surface promotes combustion by contact action; indeed, since the temperatures of ignition calculated by the adiabatic law were practically constant, whether the cylinder was at 122 deg. Fahr. or over 176 deg. Fahr. at the moment of compression, such action, if any, must be negligible.

A greater difficulty arises in calculating the ignition temperatures from the observed compressions necessary to fire the mixtures, since the recorded measurements of the specific heats of these vapors vary considerably. However, the latest determinations made by Thibaut give values for the ratios of the specific heats which appear probable. We have accordingly taken the round figure 1.05 for the mean ratio of the specific heats for ether between 50 deg. and 350 deg. C. (122 to 662 deg. Fahr.). From the velocity of sound in pentane vapor at 50 deg. C. we have taken the mean ratio between 50 deg.-500 deg. C. (122 and 932 deg. Fahr.) at 1.065.

The temperatures of ignition calculated from the compressions must be regarded as only approximations. What is more important, especially for the engine designer, is the fact that this method gives with a near approach to accuracy the actual volume change necessary to fire the particular mixture by adiabatic compression, starting from any known temperature. The calculated ignition temperatures will probably be varied as our theoretical knowledge of vapors improves; but the compression volumes determined are independent of theory.

The ignition compressions were measured by a system of trial and approximation. For each mixture the compressions were gradually increased until the mixture exploded; in another series the compressions were gradually reduced until the mixture did not explode. Then experiments were made in the neighborhood of these two points, and a mean compression taken between the nearest exploding and non-exploding trial. In some cases the compressions "overlapped"—a non-explosive mixture being fired by a slightly less compression in a second trial. In such cases I have inclined to the lower value as the safer to give. Of all the vapors and mixtures tried, the vapor of pure benzol mixed with air seemed to have the most indefinite ignition temperature. I have given in the appended table the lowest compression limit observed.

The ignition temperatures by adiabatic compression for alcohol with oxygen and with air are what we should expect from the results at atmospheric pressure. At the high pressure the ignition temperatures are lower. With pentane the results show a similar agreement, but with ether the results are discordant. The ignition temperatures in the heated tube at atmospheric pressure were much lower with oxygen, and much higher with air than the temperature found by compression. The latter were very consistent and definite.

The Movements of Flame Through Explosive Mixtures

The mode in which the flame spreads throughout an explosive mixture of gases and the rapidity of chemical combustion taking place in the flame depend not only on the nature of the gas mixture, but on the method of firing. When an explosive mixture is lit by a flame or a hot wire near the open end of a tube the flame travels through the mixture slowly at first, then more quickly and jerkily. Fired near the closed end of a tube, the same gas will propagate a flame with greatly increased velocity. When the gas mixture is fired by a spark the travel of the flame depends on both the intensity and the position of the spark. When the spark is passed close to a surface the flame starts slowly; when the spark is at a short distance from one end the sound wave starting backward from the spark, and traveling faster than the flame, reaches the near end, and is reflected back—passing through the flame, and hurrying it up. Similarly if the tube is short the sound wave starting forward from the spark may reach the far end of the tube before the flame, and being reflected back passes through the advancing flame—checking its advance, but causing more rapid combination where the sound wave passes. These reflected

Firing by Compression

Volumes.			Alcohol with Oxygen and Nitrogen.		
Alcohol	O ₂	N ₂	Ratio of Spec. Heats	Compression Ratio $\frac{V_1}{V_2} = C$	Ignition Temp. C. F.
1	2	..	1.200	34.6 at 60° C.	405 761
1	3	..	1.225	21.8 at 50° C.	375 707
1	5	..	1.260	14.8 "	380 716
1	10	..	1.307	11.5 "	410 770
1	15	..	1.33	11.3 "	445 833
1	3	2	1.26	20.4 "	435 815
1	3	7	1.307	18.2 "	515 959
1	3	12	1.33	17.0 "	550 1022

Ether			Ether with Oxygen and Nitrogen		
	O ₂	N ₂			C. F.
1	6	..	1.206	18.6 at 50° C.	315 599
1	10	..	1.25	11.3 "	320 603
1	15	..	1.283	8.7 "	325 617
1	21	..	1.308	7.4 "	325 617
1	30	..	1.33	6.5 "	325 617
1	6	4	1.25	10.9 "	315 599
1	6	9	1.283	8.24 "	315 599
1	6	15	1.308	7.14 "	320 603
1	6	24	1.33	6.37 "	320 608

Pentane, with Oxygen and Nitrogen.

Volumes.			Ratio of Spec. Heats	Compression Ratio.		Ignition Temp.	
Pentane.	O ₂	N ₂		At 50° C.	At 100° C.	C.	F.
1	8	..	1.253	23.5	13.4	445	833
1 (Iso)	8	..	1.253	23.5	13.4	445	833
1	12	..	1.285	17.5	10.5	455	833
1	16	..	1.306	14.7	9.1	460	860
1	24	..	1.331	11.8	7.7	460	860
1	32	..	1.345	10.9	7.2	465	869
1	40	..	1.355	10.3	7.0	470	875
1	8	8	1.306	17.6	11.1	505	941
1	8	16	1.331	14.5	9.4	510	950
1	8	24	1.345	12.8	8.5	505	941
1	8	32	1.355	12.1	8.1	510	950

Hexane, with Oxygen and Nitrogen.

Hexane.	O ₂	N ₂	Ratio of Spec. Heats	Compression Ratio.	Ignition Temp.
1	9½	38	1.358	11.4 7.6	500 932

Alcohol-Benzol Mixtures.

Volumes.			Ratio of Spec. Heats	Compression Ratio.		Ignition Temp.	
Alcohol.	Benzol	Air.		At 50° C.	At 100° C.	C.	F.
1.0	.0	15	1.33	17	11	550	1022
.8	.2	19.5	1.34	15.5	10.1	547	1016
.6	.4	24	1.345	14.8	9.75	545	1013
.4	.6	28.5	1.35	13.4	8.9	530	986
.2	.8	33	1.353	12.0	8.0	504	940
.0	1.0	37.5	1.355	10.2	6.8	464	867

Alcohol-Ether Mixtures.

Volumes.			Ratio of Spec. Heats	Compression Ratio.		Ignition Temp.	
Alcohol.	Ether.	Air.		At 50°	At 100°	C.	F.
1.0	.0	15	1.33	17	11.0	550	1022
.9	.1	10.5	1.33	15.6	10.1	525	977
.8	.2	18	1.33	14.2	9.1	500	932
.75	.25	18.75	1.33	10.6	6.8	430	806
.7	.3	19.5	1.33	9.2	5.9	395	743
.6	.4	21	1.33	8.2	5.3	370	699
.5	.5	22.5	1.33	7.33	4.7	350	662
.0	1.0	30	1.33	6.35	4.1	320	608

waves, due to sound, are more intense than the original flame, and they become more intense by the combustion they promote. It may thus happen that the explosion only becomes brilliant after the flame has completely traversed the mass of combustible gas. In this brilliant flame which can be analyzed photographically on a rapidly moving film, the sound waves can be seen crossing and recrossing the tube from end to end. The flame traversed by these intense waves may be (and usually is) so much more luminous than the original flame that the latter may escape detection altogether. Von Oettingen, a pupil of Bunsen, who first photographed these waves, declared that the explosion wave itself was completely invisible, and one only saw bits of glass and dust detached and heated up by the non-luminous explosion. My photographs have proved that the explosion wave is not set up at once, but that the flame starts slowly, and gradually increases in velocity and intensity, especially when sound waves are reflected through it. At a certain point in its course the explosion wave may be started; this point is marked by several distinct characteristics. The speed of the flame increases. It is no longer varying, but constant, and it continues at a constant velocity as far as the gas mixture extends. As it travels faster than sound in the unburnt gas it can send no pressure wave in front of it. At the moment when the explosion wave is started forward a well marked wave—which I have called the retonation wave—is sent backward through the burning gases and a dark region is left between the two bright waves. When the explosion wave strikes the end of the tube it sends back a reflection wave, which is easily photographed as it passes backward through the heated gas—in many cases undergoing secondary combustion—for example, the burning of carbon monoxide formed in the explosion wave.

If the tube is of such a length that the explosion wave has not been set up by the time the flame reaches the end of the tube, a reflected wave comes back across the flame. This promotes combustion, which may become very intense at the first or second reflection; it does not set up a true detonation, and the flame lasts much longer than if the explosion wave had been started. But the flame may reach the end of the tube at the precise moment when the explosion wave starts. In this case the wave of retonation comes back with the reflection wave superposed on it—with the result that it is scarcely distinguishable from the explosion wave itself. This is the extreme instance where a reflected wave differs wholly in velocity and intensity from the impinging wave. The chemical reactions appear to be as rapidly completed in this wave as in the true explosion wave. It is evident that in the original flame the combustion is slow, and Bunsen's statement that the spread of the flame "is synchronous with complete combustion" is quite erroneous.

The size and shape of the explosion vessel are important elements in determining the nature of the flame, and so is the position of the spark.

Unfortunately the initial flame in alcohol is hard to photograph, and it is especially difficult when the vapor is mixed with air. After many trials we have succeeded in getting photographs on which the initial flames can be traced and a comparison made between alcohol and other vapors under similar conditions, but the images are too faint to make prints or lantern slides from.

A careful comparison of the photographs yields an unexpected result: The alcohol flame starts faster than the hexane, pentane, and ether flames, which keep close together, while the benzol flame is left far behind. But though the alcohol flame is quick off the mark it cannot increase the pace as the others do. Hexane catches it in less than seven ten-thousandths of a second, ether and pentane a moment later.

There is a general opinion that if the charge is fired in any part of the combustion chamber of an engine by "spontaneous ignition," that is, by compression before any flame reaches it, this portion of the charge necessarily detonates. Nernst has given his authority to this view. Now, it is possible to photograph on a rapidly moving film, and analyze the flames produced by the rapid compression of gas mixtures. It has been found in all cases of firing by adiabatic compression that the flame starts comparatively gently, and does not set up detonation immediately. Indeed, many gas mixtures, fired by compression, do not set up the explosion wave, but continue to burn quietly while they push out the piston. Such flames, in spite of the rapid compression, are singularly free from the sound waves that are so strongly marked when the gases are fired by a spark. Of course, an explosion wave is more readily set up in a hot compressed gas than in a similar uncompressed gas, but compression does not necessarily set up the explosion wave. In this connection I should like to give a word of warning against any conical pocket or recess in the combustion chamber—for example, in the sparking plug; for it is much easier to produce firing by compression when the gas is driven toward the small end of a cone. If it be found necessary to quicken the initial flame, two sparks might be employed at such a distance apart that the sound waves started from each should cross and intensify the other flame.

The Detonation of Alcohol and Other Vapors

The detonation of a gas mixture, as of a high explosive, is due to the passage of an extremely rapid shock or wave through the substance, the intensity of the shock being continually renewed by the chemical reactions it produces as the shock passes from molecule to molecule. The explosion wave, discovered by Berthelot, and observed almost at the same time independently by Le Chatelier and myself was explained by Berthelot as due to molecular impacts causing a disk of flame to move forward with the mean velocity of the molecules themselves while they still retain all the heat due to the chemical change. The explosion wave is therefore a definite physico-chemical constant depending only on the nature of the burning substance, and calculable when the chemical change and the heat evolved are known. Although certain factors in Berthelot's formula have been shown to be erroneous, his fundamental idea connecting the rate of the flame with the velocity of the reacting molecules has been retained. It is now seen that in the explosion the mass of reacting gas moves bodily forward, comes to rest and swings back again. According to Prof. Jouguet, the explosion wave travels forward with the velocity of sound in the forward moving gas, which is itself moving with nearly the same velocity, and therefore the actual rate of the explosion wave is equal to the sum of these two velocities, or twice that of sound in the burning gas. Fortunately this conclusion is easy to verify with the camera. A sound wave can be dispatched through the burning gases behind the explosion wave, and its movement can be photographed—if it is not too close to the intensely bright explosion wave. Such a sound wave travels nearly as fast as the explosion wave it is following—the difference in rate being due to the gas, in which it is propagated, having already lost a little of its forward velocity.

The close approximation between the measured velocities of the explosion wave and those calculated from M. Jouguet's formula show, I think, that the chemical combination must be very rapid in the wave, whereas in the region of ordinary explosion the flame traverses the vessel, leaving a large percentage of slowly burning gas behind it. In the explosion wave the collisions of molecules are so violent that most of them cause chemical change where

this is possible, and the flame is usually short lived and intense. In ordinary explosions only a small proportion of the molecular collisions are chemically fruitful, and the flame continues to burn long and quietly.

Now, the explosion wave or detonation has the effect of a hammer blow on the walls of the vessel; hence the use of high explosives in which the explosion wave is set up by a detonator. Detonation must be avoided in the internal-combustion engine; hence it is necessary to determine the conditions under which it can be set up in alcohol and other vapors. All the vapors tried will detonate when they are mixed with oxygen and fired in a long tube. When mixed with air under atmospheric pressure alcohol and ether just propagate the explosion wave, while pentane and benzol are just beyond the limit. But though these vapors will not detonate with air under atmospheric pressure, it is evident that an increase in pressure such as is used in an automobile engine would bring them within the range of detonation.

As might have been predicted from previous work on cyanogen, ethylene, and acetylene, it was found that alcohol, ether, pentane, and benzol all gave faster rates of detonation when mixed with oxygen insufficient for complete combustion. This is explained in part by the formation of carbon monoxide, either directly or indirectly, in the wave front, while the formation of carbon dioxide is only possible where the flame is cooler—behind the wave front; and possibly by the separation of free hydrogen. In the explosion of benzol with insufficient oxygen large quantities of finely divided carbon were deposited, some of the molecules probably breaking up by impact in the wave front into free carbon and hydrogen. There appears to be no striking difference between the four fuels in the rates of the explosion wave either when the vapors were fired with pure oxygen or when the explosions were damped down with nitrogen. The ether mixtures gave slightly the fastest rates, alcohol the slowest, under similar conditions.

The accuracy with which the rate of the explosion wave can be measured has suggested its use in determining the temperatures reached in explosions and the specific heats of the gases concerned. The rate has also been used for determining the nature and the order of the chemical changes taking place in explosions—for example, for showing by what steps the carbon in hydrocarbons is burnt.

Conclusion

In the course of these researches it has been made clear that alcohol possesses most of the properties required in a motor-fuel. As compared with gasoline, its lower calorific value is almost compensated for by the greater compression at which it can be used—and this property (of high ignition temperature under compression) is hardly altered by admixture with 20 per cent of benzol, or of gasoline itself. Such a mixture readily starts in the cold, and has been shown to run very smoothly, and without knocking in an engine.

I have not touched on the question of denaturing, but I would urge that the less methyl alcohol employed the better for the liquid as a fuel. By cutting down the wood spirit the strength of the explosion is increased, and it should not be necessary to maintain the present high proportion since the nauseous taste of crude wood spirit is largely due, not to the methyl alcohol itself, but to a small quantity of a less volatile constituent.

I think there would be some advantage if one or two standard alcohol mixtures were authorized, one of which could be used in existing engines with only slight adjustments. Engineers would soon work out the most efficient designs for burning a standard power alcohol.

If alcohol mixtures can be used for ordinary motor transport, saving 70 to 80 per cent of other fuel, by so much will our limited resources of petrol and benzol be husbanded for the special services in which they cannot be replaced.

Civil Aviation in England

DURING the six months between April 1 and Sept. 1 a total of 689,600 machine miles were flown by British civil aviators, a large increase over the mileage of the preceding half-year. The number of passengers carried has also increased, the figure for the period named being 32,345. The number of departures and arrivals to and from England and the Continent has increased from 734 to 2445.

This large development in civil aviation has naturally brought with it many improvements in service and facilities. Landing fields have increased in number and have been improved in quality. Regulations regarding pilots have been revised, and extensive research in regard to power plants has been carried on. Much of this information is of interest to those interested in American aviation and is contained in the recent Half-Yearly Report on the Progress of Civil Aviation, presented by the British Air Ministry.

Interesting investigations have also been carried out to minimize the effects of mist and fog by mechanical dispersal, to secure the illumination of landing grounds, and to produce mechanical apparatus to cause machines to flatten out automatically before touching the ground. Methods have also been investigated for obtaining instruments to indicate accurately to the pilot his position in relation to the airdrome, and his height above the ground.

The Department of Research has been paying special attention to the development of new types of power plant. If these experiments are successful, it will be

possible to use a fuel of a higher flash point, thus increasing both safety and cheapness.

Several new designs of aircraft with facilities for making adjustments to the engines during the flight are being made, and a satisfactory engine starter for use on the ground is now available.

The report states that a wireless direction finder apparatus, which had been installed at Croydon, proved to be of great value. It enables aircraft to correct their course in thick weather. The equipment of aircraft with wireless telephones is becoming more common, as it has been found to be of great assistance to navigation.

Names of towns and railway junctions around London are being so marked that they can be seen from the air, and electric landing lights for indicating the direction of landing are being installed at the Croydon Airdrome.

The Air Ministry has given assistance to insurance companies to establish aviation insurance on a sound basis. Lloyds have issued a civil aircraft record, the first publication of its kind in any country.

ACCORDING to the Department of Statistics of India, 1041 motor cars were imported into British India during September, 1920, and of them no fewer than 723 cars were consigned from the United States, only 247 being received from the United Kingdom. During the six months, April to September, 1920, the number of motor cars imported was 7498, valued at 308 lakhs of rupees, Bombay imported 2775 cars, Bengal 2694, Madras 908, Sind 590 and Burma 531.

Twenty-two More Tractors Undergo Nebraska Tests

Nearly all require some adjustments during tests. While difficulties are mostly of a minor nature, the need for intelligent instructions to users and adequate provision for service are again evidenced. Nearly all firms given to extravagant statements in advertising matter.

TWENTY-TWO more tractors have satisfactorily completed the official test required under the Nebraska State Law before the tractor can be marketed in the State. A summary of the results of the test is given in the accompanying table, this supplementing the previous reports which appeared in the issues of AUTOMOTIVE INDUSTRIES for Sept. 2 and Dec. 30, 1920.

In the summaries of the tests already printed little has been said concerning the matter of adjustments and repairs, although the official reports devote some space to listing items of this nature that proved necessary or were considered desirable by the manufacturers during the test. An analysis of this portion of the report shows that very few tractors were able to complete the test, or the preliminary run for limbering up which preceded the test, without some change, adjustment, repair or replacement. Of the twenty-two tractors tested in accordance with reports summarized herewith no less than ten required adjustment or re-grinding of the valves before the tests were completed. Seven were in trouble due to over-heating or required some change or adjustment in the cooling system. Of these several experienced some trouble with the fan or fan belt, and others with parts of the water pump or circulating system. Eight tractors had spark plug trouble, or considered it desirable to replace or clean plugs during the test. Some tractors blew out as many as five plugs in the endurance test.

Cleaning or some adjustment or change in the air-cleaner or carbureter system was required on seven tractors. Five required adjustments to the clutch, chiefly to prevent slipping, while four had difficulty in lubrication of individual bearings or with some part of the engine lubrication system. Unsatisfactory lubrication caused the burning out or scoring of bearings on two tractors, and one required adjustment of the connecting-rod bearings.

The ignition system on four machines required repair, adjustment or replacement during the test. Three machines had piston ring trouble, and found it desirable to replace or repair rings. In three other machines the gearing gave some difficulty, in one case a key which had fallen out requiring replacement. The governor was the cause of trouble on three machines and two others had trouble with the fuel supply system, one from a leaking tank, and the other from a clogged gasoline pipe. In one case the cylinder heads of the engine cracked and were replaced. In several cases the cylinder heads were removed for inspection purposes and required new gaskets when the head was replaced.

While in all cases covered by reports here summarized the repairs and adjustments required were not considered sufficient to disqualify the tractor, the results make

it plain that the tractor user must expect to make adjustments, replacements or repairs to the machine in normal use, and should therefore make it a point to know the machine and be prepared to keep it in operable condition.

Furthermore, it is apparent (if further evidence is needed) that the manufacturer who expects his machine to give satisfaction to the user must insist upon the distributor or dealer preparing for and giving prompt and intelligent service.

This service should start by seeing to it that the purchaser is fully instructed in the operation and care of the machine at the time of or prior to its delivery.

Prof. Oscar W. Sjorgren, chairman of the Agricultural Engineering Department, of the University of Nebraska, who had general supervision of the tests, recently presented a paper before the American Society of Agricultural Engineers in which the following particulars were given:

Of the 68 tractors which appeared for test 39 went through without any changes, while 29 made changes as follows: Eleven have changed or will be required to change their rating, 6 increased the rated engine speed, 11 changed some item of equipment and 3 withdrew after the preliminary test. Of the 11 which changed equipment, 2 also changed their rating. One of those which withdrew later made a re-application, reappeared and finished the test. These results indicate the necessity for a method of intelligently testing and rating tractors. These tractors have all been tested under conditions as nearly uniform as it is possible to secure, by a competent and unbiased force of men.

It is interesting to note how few of the large number of tractors tested conformed to the recommended standards of the S. A. E. and the A. S. A. E. The standards as to horsepower ratings read as follows: "The drawbar rating shall be 80 per cent of the horsepower that the tractor is guaranteed to develop at the drawbar continuously for 2 hours, the tractors being in good condition and properly operated at rated engine speed. The belt horsepower rating shall be 80 per cent of the horsepower the engine is guaranteed to deliver at the belt pulling continuously for two hours, the tractor being in good condition and properly operated at rated engine speed."

Of the 65 tractors tested only one was rated at between 60 and 70 per cent of the maximum power it proved capable of developing, 10 were rated at between 70.1 and 80 per cent maximum power, 21 between 80.1 and 90 per cent, 23 between 90.1 and 100, and 7 above 100 per cent of the maximum power they proved capable of developing at the belt.

Three tractors were not rated. Thus it is seen that only 11 machines fall within the set standard, while 51

Details of Tractor Tests Officially Conducted Under Nebraska State Law

No. of Test	Name and Model of Tractor	Belt Tests										Drawbar Tests								Oil* Gal. per hr.
		Test at Rated b. hp. (2 hr.)			Varying Load Test				Maximum b. hp. Test (1 hr.)			Half Load Test			Rated Drawbar Load (10 hrs.)			Maximum Drawbar Load		
		hp.	r.p.m.	Hp-hr per gal.	maximum		minimum		hp.	r.p.m.	Hp-hr per gal.	hp.	r.p.m.	Hp-hr per gal.	lb.	m.p.h.	Hp-hr per gal.	lb.	m.p.h.	
					hp.	r.p.m.	hp.	r.p.m.												
20	Emerson-Brantingham	20.27	906	8.45	20.66	905	5.17	935	25.90	915	7.29	10.43	943	6.00	2037	2.86	5.73	3022	2.18	3.25-30
28	Beeman G.	2.40	1036	5.43	2.37	1019	0.17	1093	2.37	1023	5.60	1.20	1033	4.72	187	2.17	3.78	186	1.56	3.875-40
48	Twin City 40-65	65.96	534	8.38	65.96	534	2.01	752	65.53	530	8.32	33.48	542	6.00	7736	2.00	5.73	10,820	1.72	15.25-28
51	Lauson 15-30	30.14	960	8.19	33.63	958	1.01	1008	32.46	980	7.23	15.66	990	6.59	2512	2.64	4.89	5191	1.91	4.50-31
52	Flour City 40-70	70.81	558	7.57	71.03	566	2.64	857	72.52	563	7.54	35.25	555	7.41	6869	2.33	5.52	8404	2.37	11.50-38
53	Allwork 14-28	28.41	915	6.75	28.31	910	1.53	967	28.86	915	5.83	16.06	1015	6.68	2133	2.68	3.33	3950	1.87	9-35
54	Allis-Chalmers 6-12	12.08	1011	7.11	12.09	1013	1.22	1214	12.37	1008	7.05	6.34	1054	5.95	1046	2.28	3.99	1142	2.06	2-29
55	Allis-Chalmers 18-30	30.58	839	9.30	30.86	846	1.75	1000	33.41	842	7.24	17.87	973	7.75	2704	2.85	5.93	3500	2.18	7-33
56	Monarch 18-30	30.55	952	8.43	32.22	983	1.31	1056	31.40	957	7.97	15.28	959	6.83	3443	2.10	5.18	5852	1.32	3.12-31
57	Avery 5-10	10.11	1246	5.45	10.16	1256	0.71	1309	11.14	1228	5.99	5.20	1258	6.68	914	2.46	3.27	1116	1.82	1-30
58	Avery 18-36	36.70	812	6.31	36.78	817	1.56	837	44.50	812	6.50	18.70	827	5.73	3202	2.41	3.45	4590	2.25	6-30
59	Holt 25-40	30.24	1070	7.94	30.98	1068	1.58	1186	35.52	1066	8.11	15.51	1100	5.31	3336	2.98	6.39	5558	1.36	7.75-35
60	Bates Steel Mule, Model D, 15-22	22.66	1110	7.12	22.89	1088	0.94	1212	24.84	1116	6.61	11.72	1147	6.20	2566	2.48	5.46	2996	2.59	4.75-29
61	Holt 40-60	55.25	763	7.16	56.11	760	2.03	900	57.21	772	6.41	31.67	872	5.71	4963	3.23	4.91	9756	1.63	9-33
62	Indiana 5-10	10.20	1024	8.52	10.52	1001	0.53	1127	11.34	1023	5.13	5.36	1083	6.39	849	2.21	3.71	1189	1.79	2-28
63	Townsend 15-30	28.35	526	9.38	27.43	510	1.96	582	29.51	533	7.58	15.17	563	8.66	2559	2.24	4.73	2681	2.50	2-30
64	Uncle Sam 20-30	30.75	1025	4.85	30.00	1009	4.10	1099	32.20	1041	5.02	15.17	1053	5.78	2954	2.79	3.83	3264	2.57	4.50-34
65	Toro 6-10	10.56	1208	8.48	10.63	1197	0.80	1326	13.31	1219	7.70	5.54	1265	5.03	893	2.66	4.31	1310	2.84	1.50-30
66	Square Turn 18-35	30.35	854	6.39	31.20	844	1.24	1020	32.19	848	6.02	17.44	975	5.64	2904	2.47	3.91	3090	2.85	5-39
67	Twin City 20-35	35.22	905	8.39	35.40	911	1.03	908	46.88	905	7.81	18.73	953	5.34	2599	2.91	4.55	5730	2.23	8.50-32
68	Bates Steel Mule, 15-22	22.20	1112	7.39	22.50	1101	0.76	1118	29.78	1108	8.30	11.13	1112	5.71	2558	2.37	6.07	3100	2.81	4.50-32
69	Port Huron 12-25	25.14	893	5.43	25.20	905	1.13	1069	28.46	895	6.69	13.56	959	6.81	2320	2.32	3.74	4144	1.85	9.25-32

*In engine only. The reports give kind of oil and amount used in transmission.

machines carry a rating higher than permitted by the standard.

On the drawbar work it was found that in all but two instances no difficulty was had in securing the rated drawbar horsepower if the rated belt horsepower was developed. The maximum drawbar horsepower was not obtained through any extended period, but the rated load was carried for ten hours.

In these tests 7 tractors were rated at between 50 and 60 per cent of the maximum drawbar horsepower they proved capable of developing, 12 between 60.1 and 70 per cent, 25 between 70.1 and 80 per cent, 9 between 80.1 and 90 per cent, 5 between 90.1 and 100 per cent and 2 above 100 per cent of the maximum drawbar horsepower they proved capable of developing. Five tractors had no drawbar ratings.

Thus it is seen that 45 tractors fall within the standards set for the drawbar rating as compared to only 7 falling in this class on the belt tests. Seventeen carry a rating higher than the standard, 2 of these being rated at more than they can actually develop.

Belt Speed

A very great variation exists in the belt speeds employed by different tractors as indicated by the following:

Tractors	
Less than 2000 ft. per min.	2
2000 to 2199 ft. per min.	5
2200 to 2399 ft. per min.	2
2400 to 2599 ft. per min.	6
2600 to 2799 ft. per min.	13
2800 to 2999 ft. per min.	6
3000 to 3199 ft. per min.	7
3200 to 3399 ft. per min.	9
3400 to 3599 ft. per min.	7
3600 to 3799 ft. per min.	1
3800 to 3999 ft. per min.	3
Above 4000 ft. per min.	3

The following comments concerning advertising matter put out by the various manufacturers who build the machines, tests of which are summarized herewith are contained in the official reports and indicate that many

of the builders are given to the use of exaggerations or claims not substantiated by satisfactory evidence:

Test No. 20—Emerson-Brantingham 12-20. In the advertising literature submitted with the application for test of this tractor, we find some statements and claims that cannot be directly compared with the results of this test as reported above. It is our opinion that none of these are excessive or unreasonable.

Test No. 28—Beeman Model G. Remarks same as for Test No. 20.

Test No. 48—Twin City 40-65. In the advertising literature submitted with the application for test of this tractor, we find some claims and statements which cannot be directly compared with the results of this test as reported above. It is our opinion that none of these claims or statements are unreasonable or excessive except the following:

"This 65 hp. engine is perfectly governed."

Test No. 51—Lauson 15-30. In the advertising literature submitted with the application for test of this tractor, we find some claims and statements which cannot be directly compared with the results of this test as reported above. It is our opinion that none of these are excessive or unreasonable except the following:

"Whether running idle or on the full load, the Lauson burns all the kerosene."

"The Lauson burns every particle of kerosene. This close regulation makes every drop of fuel count and there is positively no waste."

Test No. 52—Flour City 40-70. In the advertising literature submitted with the application for test of this tractor, we find some statements and claims which cannot be directly compared with the results of this test. It is our opinion that none of these are unreasonable or excessive except the following:

"There seems to be no load too great for it to pull."

"The gears are made—and they are unequalled for substantiability and long life."

Test No. 53—Allwork 14-28. Remarks same as for Test No. 20.

Test No. 54—Allis-Chalmers 6-12. In the advertising literature submitted with the application for test of this tractor we find some statements and claims which cannot be directly compared with the results of this test as reported above. It is our opinion that none of these are excessive or unreasonable except the following:

"To-day it stands forth—as the most efficient small power unit available."

"There is no loss of power, no deadweight, no lost motion in the Allis-Chalmers general purpose tractor."

Test No. 55—Allis-Chalmers 18-30. Remarks same as for Test No. 20.

Test No. 56—Monarch 18-30. In the advertising literature submitted with the application for test of this tractor, we find some claims and statements which cannot be directly compared with the results of this test as reported above. It is our opinion that these are not excessive or unreasonable, except the following:

"The Monarch will go *anywhere*."

Test No. 57—Avery Single Row Cultivator 5-10. In the advertising literature submitted with the application for test of this tractor, we find some claims and statements which cannot be directly compared with the results of this test as reported above. It is our opinion that none of these are excessive or unreasonable except the following:

"The Avery Motor Cultivator is the only real successful cultivator on the market to-day, as it leads the field in power, durability, simplicity, etc., over *any* cultivator built."

Test No. 58—Avery 18-36. In the advertising literature submitted with the application for test of this tractor, we find some claims and statements which cannot be directly compared with the results of this test as reported above. It is our opinion that none of these are excessive or unreasonable except the following:

"Avery tractors have motors with patented gasifiers that turn kerosene or distillate into gas and burn it all."

"Avery—is the—most efficient belt and drawbar transmission system built."

"Avery—is the most 'direct drive' transmission system built."

"A larger percentage of the power developed by the motor in Avery tractor is delivered to the belt wheel and to the drawbar than in any other tractor built."

"Avery opposed motors are superior to any tractor motor built."

"The opposed type of motor—is much better adapted for use in tractor work."

"The fuel system used on the Avery tractors from the 8-16 hp. to the 40-80 hp. size burns kerosene, distillate or any other low grade fuel more successfully than it has been ever done before."

"Avery tractors are the simplest tractors built."

"Averys are the best all-around drawbar and belt tractors built."

Test No. 59—Holt T-11. Starting the "limbering up" run, the tractor was operated in mud. It pulled about three-fourths of its rated load the entire twelve hours.

Test No. 60—Bates Steel Mule, Model D, 15-22. During the "limbering up" run, the tractor was operated in mud for about 8 hours, pulling about three-quarter load.

In the advertising literature submitted with the application for test of this tractor, we find some statements and claims which cannot be directly compared with the results of this test as reported above. It is our opinion that none of these are excessive or unreasonable except the following:

"The Bates Steel Mule is the most efficient tractor in Amer-

ica to-day, barring none."

"The Bates Steel Mule will always work equally well in dry or wet soil, good or bad condition."

"The Bates Steel Mule is a *perfect* field machine."

Test No. 61—Holt Model T-16, 40-60. This tractor was operated in mud during the last eight hours of the "limbering up" run, pulling about three-fourths of its rated load.

Test No. 62—Indiana 5-10. In the advertising literature submitted with the application for test of this tractor, we find some statements and claims which cannot be directly compared with the results of this test as reported above. It is our opinion that none of these are excessive or unreasonable except the following:

"The Indiana is the nearest perfect power plant for the farm use."

"No other tractor can anywhere near approach the amount of work which can be performed by an Indiana in a whole season on the farm—"

"Mechanically the Indiana is right."

Test No. 63—Townsend 15-30. In the advertising literature submitted with the application for test of this tractor, we find some statements and claims which cannot be directly compared with the results of this test as reported above. It is our opinion that none of these are excessive or unreasonable except the following:

"The Townsend transmission is as near frictionless—All power is delivered at the drawbar, etc.—"

"That it will stand the hardest use without falter or need of repair or attention."

"Townsend patented carbureter is one of the most economical and thorough burners of kerosene possible to obtain. There is a remarkable *freedom from carbon or smoke*, etc."

Test No. 64—Uncle Sam 20-30. Remarks same as for Test No. 20.

Test No. 65—Toro 6-10. Remarks same as for Test No. 20.

Test No. 66—Square Turn 18-35. In the first tractor submitted for test, the motor was found defective, and the company was allowed to substitute another tractor.

During the rated drawbar test one-half of track was sprinkled but tractor was hard to control with one wheel on slightly damp soil, so sprinkling was discontinued.

In the advertising literature submitted with application for test of this tractor, we find some statements and claims which cannot be directly compared with the results of this test as reported above. It is our opinion that none of these are excessive or unreasonable except the following:

"In the Square Turn we use the well-known Climax engine. Because of its superior design—it has earned the reputation of being practically 'trouble-proof.'"

"First you have—but turning three 14-inch furrows 10 inches deep under practically all soil conditions."

"It will always transmit the power of the motor *without loss* and without slippage."

Test No. 67—Twin City 20-35. Remarks same as for Test No. 20.

Test No. 68—Bates Steel Mule 15-22. Remarks same as for Test No. 60.

Test No. 69—Port Huron 12-25. Remarks same as for Test No. 20.

Ford Tractors in Germany

IN connection with the report that the Ford Company was in negotiation with the firm of Ehrich & Graetz, Berlin, for the establishment in Germany of works for the production of farm tractors, the *Berliner Zeitung* learns from the latter firm that the report is correct. It appears that the motors will be imported from America, but that the other parts of the tractors will be produced in Germany according to Ford specifications. The complete tractors will then be assembled in German factories built or bought by the Ford Company. For the time being only tractors will be manufactured, but the eventual production of motor cars

also is contemplated. During the first year only ten or twenty tractors will be turned out daily, but it is hoped to increase this number considerably in two years time.

ONE of the five fellowships in Highway Engineering and Highway Transport recently awarded by the University of Michigan went to Chia T. Yeh, a Chinese engineer who has been taking the special highway course at Ann Arbor. If Yeh returns to China and exerts the influence this fellowship should give him, it should increase the prospective sale of many motor vehicles there.

A Revolving Air-Cooled Engine

Has cylinder axes parallel to axis of rotation and utilizes wobbling-plate principle. Is of four cycle type but has planetary gear so arranged that engine makes one revolution for two revolutions of plate, thus combining high piston speed with low rotative speed. Single sleeve valve of cast iron is employed in each of five aluminum cylinders.

THE wobbling plate is an old mechanism that was probably first used in steam engines with a view to doing away with the crankshaft, which is considered an inefficient device by some inventors. The argument against the crankshaft is that at the moment of greatest pressure in the cylinder it affords no effective torque arm, so that it is impossible to get a tangential effort on the shaft. We now realize that this objection to the crankshaft is based on a misconception.

But while the wobbling plate may not be inherently superior to the crankshaft for transforming reciprocating into rotary motion, it makes possible a type of engine which can be easily air-cooled and which, on account of the absence of a flywheel, can be built very light. Several gasoline engines of this type, intended for automobile service, have been built in the past. In 1912 M. Canton Unne of France constructed such an engine which was extensively featured in the trade press at the time. In this the motion of the wobbling disk was transmitted through a pair of bevel gears. In this country during the early period of the war the Macomber car, which had an engine of this type, was advertised extensively.

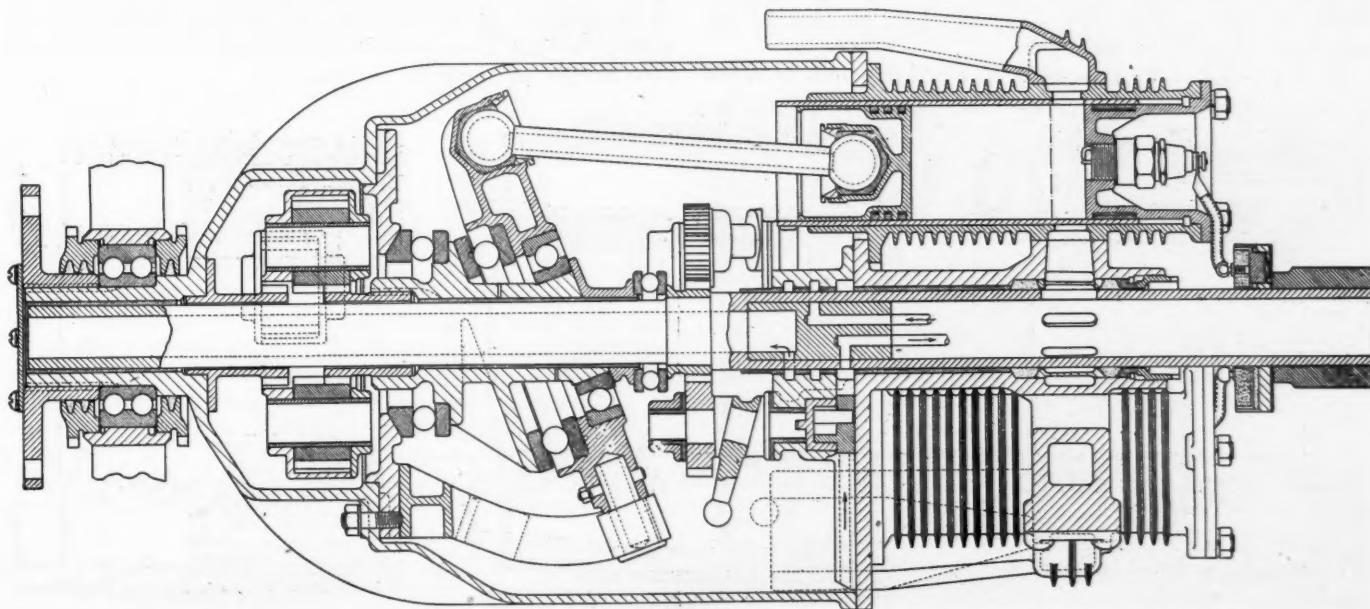
Judged by our present practice, a wobbling disk type is an engine of quite radical design, but it is clear that, in certain forms at least, it offers important advantages. Since the whole engine revolves, no separate flywheel is required. Still, if a moderate number of cylinders is used, the distance of the cylinder axes from the axis of rotation can be kept small, so there need be no excessive strains due to centrifugal force.

Owing to the rotary motion of the cylinders, they can readily be air cooled without fans or blowers, though, as in radial rotating engines, the leading and trailing sides are probably cooled somewhat unequally.

A new design of wobble plate engine has been evolved by the Nedoma-Najder Motor Syndicate and is illustrated by the sectional view herewith. This apparently represents a considerable advance over previous designs. By a special arrangement of the wobbling disk, its rate of wobbling is doubled, so that, although the cylinders operate on the four-stroke principle, there is one explosion in each cylinder for each revolution of the engine. This is an original feature and evidently makes it possible to combine high piston speed with a moderate speed of revolution, both of which are desirable, the first, because it results in high power per unit of displacement and in the high thermal efficiency and the second, because it reduces the strain due to centrifugal force on the engine structure.

Poppet valves are not very suitable for use in a revolving engine, owing to the effect of centrifugal force on their operation. In the engine here described a single sleeve valve type of valve is employed which has a combined rocking and reciprocating motion.

Referring to the accompanying sectional view, the whole engine is supported on a stationary hollow shaft, the forward end of which is held rigidly on a cross member of the frame. Combustible charge enters this hollow shaft at forward end and flows through ports in wall into a passage leading to the cylinder inlet ports, the opening and closing of which are controlled by the single sleeve valve.



Nedoma-Najder revolving air-cooled wobbling plate engine

The five cylinders, which have a bore of $2\frac{3}{4}$ and a stroke of $3\frac{3}{8}$ in., are cast of aluminum with the cooling ribs integral. Into the outer ends of these cylinders are fitted cylinder heads of a form similar to those used in Knight engines, there being an annular space between the cylinder head and the cylinder wall into which the sleeve extends. The spark plugs are located centrally in the cylinder heads. The valve sleeves are made of cast iron and the pistons within them of aluminum. The connecting rods are tubular, with spherical heads, which are fitted respectively into the piston and into sockets of the wobbling disk. The wobbling disk is held against rotary motion relative to the cylinders by a guide secured to the engine housing and extending through a slot of the disk. The disk is supported on two ball bearings mounted upon a hub surrounding the stationary shaft. At the left-hand end of the engine there is a sort of differential gear of the spur type, one member of which is rigidly secured to the stationary shaft. This gear assembly causes the hub to revolve in the opposite direction to that of the engine frame at the same speed. It is this mechanism which causes the disk to wobble at twice the rate at which the engine revolves.

The valve sleeves are actuated by a set of five gears,

supported in bearings carried on the engine frame. These gears mesh with a central gear on the stationary supporting shaft and, as the engine housing revolves, the five gears are caused to roll on the stationary gear. These five gears are mounted on shafts which are cut with inclined circular grooves, whereby a compound motion is given to lever arms, which connect by links to the valve sleeves. Three of these valve gear shafts are used to operate oil pumps, of which two serve to drain the engine case of oil, while the third forces the oil to all the bearing surfaces. The oil is contained in an outside reservoir which may be provided with cooling ribs, if desired. It passes between this reservoir and the engine through tubes extending through the hollow shaft.

The engine here shown is expected to develop 40 hp. at 1400 r.p.m. and to weigh 160 lb. Its firing order is 1, 4, 2, 5, 3. The power is taken off by means of the flange at the left-hand end which is keyed to a hub on the engine housing. Inclined flanges are cast onto the engine housing to facilitate cooling. The whole engine will be enclosed in a sheet metal stationary housing and the exhaust from the five cylinders takes place directly into this housing. The housing is supported by the channel type frame.

Spring Shackles Require Lateral Rigidity

SPRING shackles should be made quite rigid in a lateral direction as they are subjected to severe stresses when the car is driven around a corner at considerable speed, and particularly when it strikes an obstruction while skidding. F. Strickland in an article in *Engineering* points out that in one respect it is advisable to make the shackles long, as this reduces their angular motion on the pins and consequently the wear, but the requirement of lateral rigidity limits the length. He shows three constructions of varying degrees of rigidity.

Fig. 1 shows the simplest form of spring shackle. This was used on one make of vehicle in war service and proved the reverse of durable, but has the merit of being very cheap to make and therefore to renew. It will be seen that it fails completely to fulfill the condition of lateral rigidity. The result therefore is that the pins rapidly get loose in the shackles and the latter then cut into the pins, while the holes wear oval. The shackles as well as the pins have then to be scrapped.

It is possible that this type of shackle could be made

satisfactory if constructed as shown in Fig. 2, as considerable lateral rigidity could be obtained while all parts would still be cheap to make.

The more usual form of shackle is shown in Fig. 3. The difficulty here is that each pin has to be a push fit in the eyes, and unless this is very accurate the pin gets "alive" in the eye and rapidly wears the hole oval, in which case both shackle and pin must be scrapped.

The satisfactory working of this type of shackle depends very largely on the proportions and workmanship. If the size of the parts is ample and the work good the shackle may be very durable, but if, to save weight, the parts are made small there is considerable wear. The pins should in all cases be case-hardened and ground.

IN a recent Bureau of Standards circular (No. 89) by C. E. Waters it is pointed out that the term carbon as applied to the incrustation in internal combustion engine cylinders is a misnomer, because the deposits consist largely of asphaltic matter.

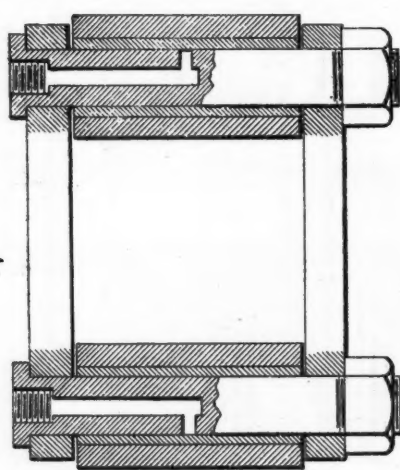


Fig. 1

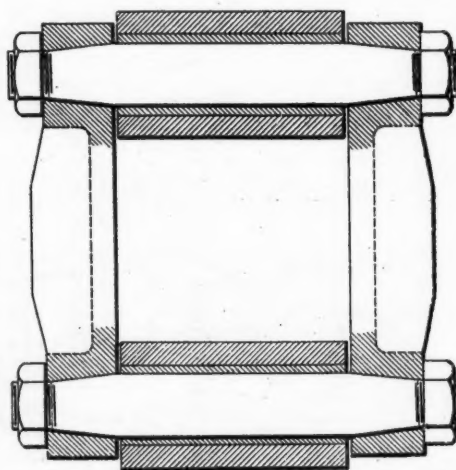


Fig. 2

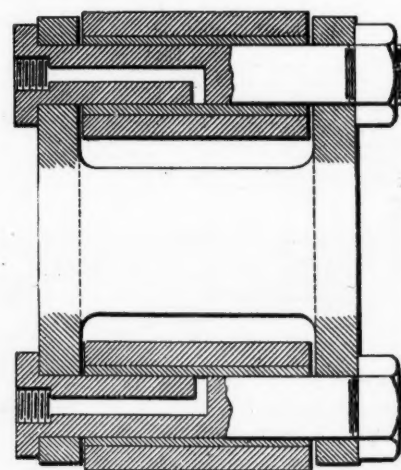


Fig. 3

Sectional views of spring shackles of various construction

The Manufacture of Magneto Magnets

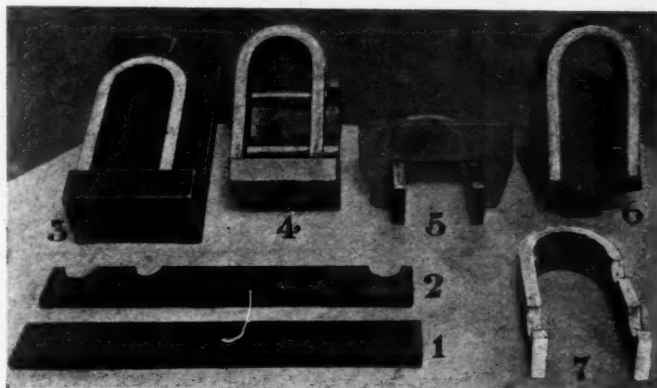
Production of U-shaped magnets from bar stock in large quantity is feature of Splittdorf plant. Forming, grinding, heat treating and testing operations systematized and under careful inspection. Magnetic strength of each piece measured in order to maintain standard.

By P. M. Heldt

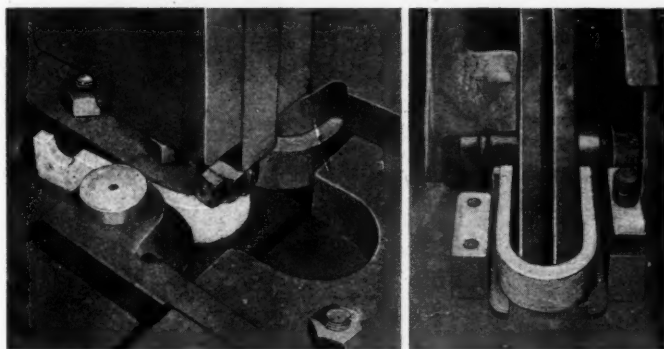
ONE of the advantages of specialized manufacture is that equipment can be installed for economical production far beyond the possibilities where a great variety of products are turned out. However, economy of production is not the only advantage of such highly developed equipment, as accuracy of product and uniformity of quality are also secured as a rule.

The above remarks are motivated by a recent visit to the plant of the Splittdorf Electrical Co. The company manufactures its own steel magnets from bar steel and has developed a manufacturing process which is both economical and efficient.

The magnet steel is received in the form of bars, which are sheared off to the proper length. These lengths of steel bar are next heated in a furnace to the working temperature. The passage through the furnace is continuous. Next the bars are put into a press in which half circles are punched out for the openings through which the rotor



1—Plain bars of steel from which magnet is formed. 2—Semi-circular holes punched, to allow projection of rotor. 3—Magnet formed in gage for height. 4—Magnet formed in gage for hole size. 5—Magnet formed in gage for distance between outside of poles. 6—Magnet formed in gage for distance between inside of poles. 7—Finished magnet



Left—Close up view of magnet just after being pressed in magnet forming machine. Right—Magnet set in grinding machine. (This apparatus grinds the inside of each leg of the magnets)

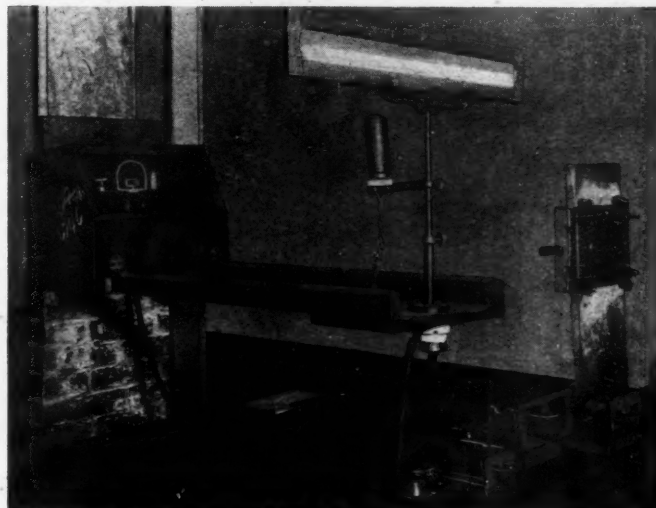
shaft extends. From this press the bars are transferred to a bulldozer, where they are bent up into U shape in a single operation. Both the punching and bending up into U form are accomplished during a single heat.

For quenching and hardening, the bars are pre-heated in another furnace, and during this operation they are held in tongues to protect them against warpage. The magnets are quenched by hand individually, the workman swinging them to and fro in the quenching bath, so as to insure uniform cooling and uniform hardness.

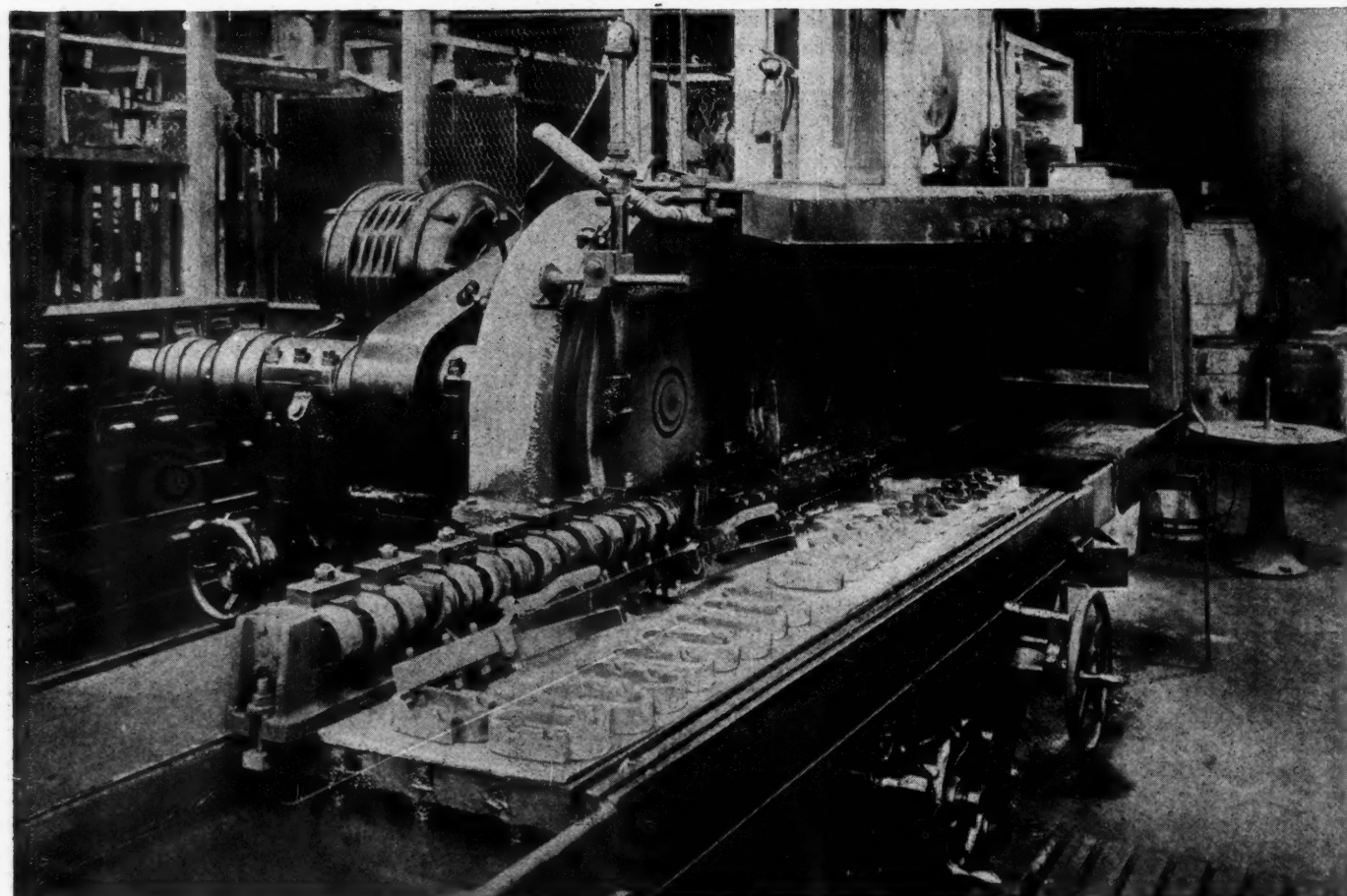
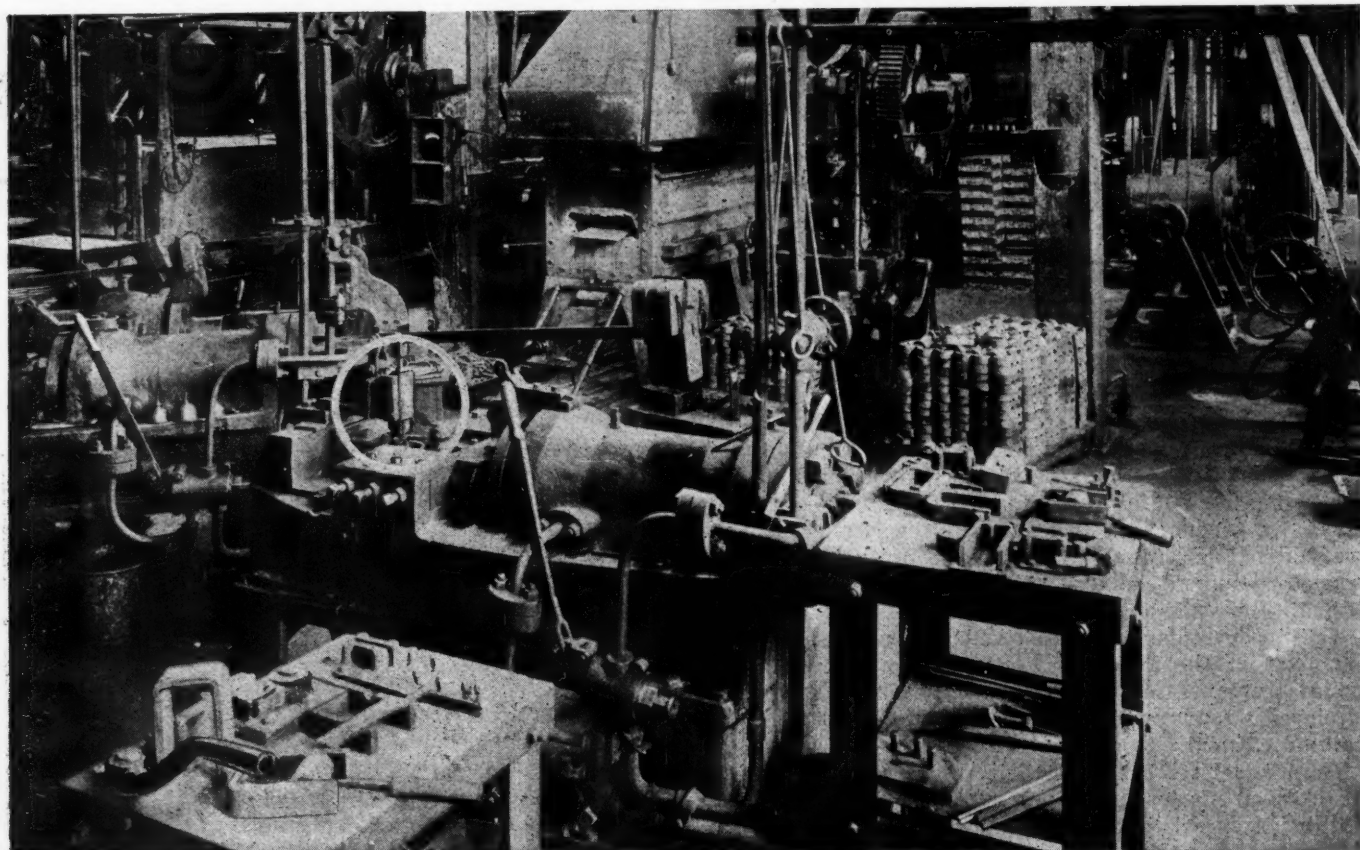
After coming out of the oil bath, the magnets are cleansed of oil in sawdust. Next, they are subjected to a preliminary bumping test, in order to show up any possible cracks or other imperfections. This consists in knocking the magnets together two and two. In another operation in the punch, following the bumping test, the legs of the magnets are bent in a little in order to pro-

vide stock for grinding on the inside. This gives the surface to which the bearing holder is fitted, this latter forming a part of the magnetic circuit.

Next comes the rough grinding of the outside of the magnet. First one side of the U is ground off, to get a surface to work from; then the other side, and finally the ends of the legs are ground off square. This completes the mechanical operations on the magnet.



Galvanometer set up for testing magnets



Upper—Forming machine and hardening department. A magnet just formed is seen within the circle marked on the forming machine in the foreground. Lower—Machine used for grinding off ends of magnets. This is a surface grinder and has a capacity of 2500 magnets per day

Magnetizing is accomplished on each magnet individually, the horseshoe being placed in a double coil magnetizing device, which is provided with an armature at one end. When the magnet is in position a switch is closed momentarily.

After the magnetizing process, each magnet is subjected to a test to show its magnetic strength, and any magnet not showing at least 20,000 magnetic lines is either remagnetized or rejected. The test is made by means of an induction coil connected to a ballistic galvanometer. The coil is wound on a rectangular frame, so arranged that the magnet can be inserted and quickly withdrawn. The withdrawal of the magnet causes the coil to be cut by the entire flux of the magnet, with the result that an electric impulse is induced in the coil, which is directly

proportional to the total number of lines of force, and independent of the speed of withdrawal. This electric impulse passes through the coil of the ballistic galvanometer, the movable system of which is comparatively heavy, so that its period of swing is much greater than the duration of the electric impulse following the withdrawal of the magnet.

The galvanometer is of the mirror type, and is provided with a scale at some distance in front of it. Behind the scale is arranged a light, in such a manner that a beam from the light falls on the mirror and is reflected onto the scale. Owing to the slow rate of swing of the movable system, the maximum reflection can be easily read off. The scale is graduated directly in thousands of lines of force.

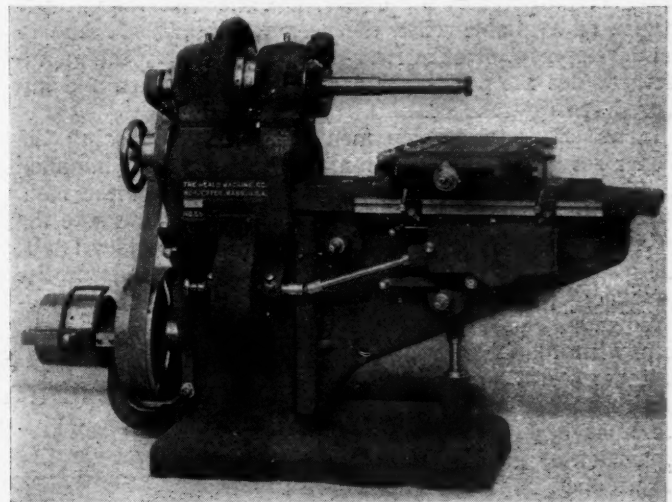
Simplified Cylinder Grinding Machine

A DEMAND for a simpler and smaller cylinder grinding machine has been met by the Heald Machine Co. by bringing out a new design in which the speed boxes and other expensive units are omitted, the drive being from a single shaft at the rear of the machine. The machine is self-contained and does not require a countershaft.

The machine embodies many of the features of earlier types. In addition to simplifying it and bringing down the price, the Heald company has increased the width of the knee and main table, so that when grinding six-cylinder blocks there is no undue overhang on either side when grinding the bores at the ends. Another change consists in an increase in the distance between the center line of the grinding spindle and the top of the cross slide table. On earlier machines this distance ranges between $4\frac{1}{4}$ and $7\frac{1}{2}$ in. but on the new one it ranges between 7 and $9\frac{1}{2}$ in. This makes it very convenient when grinding very large castings.

The eccentric and spindle arrangement is the same as heretofore. An arm, which grinds holes $2\frac{3}{8}$ in. and larger in diameter by 11 in. long, is furnished as regular equipment with this machine. It also grinds holes 3 in. in diameter and larger 18 in. long. Other size arms can

be substituted if the work requires it. The machine is designed specially to meet the requirements of shops doing a variety of work.



The Heald simplified type of cylinder grinder

A Grinder for Broaches

A GRINDER specially designed for sharpening broaches is being marketed by the J. N. Lapointe Co. It consists of a solid column supporting a vertically adjustable



The Lapointe broach grinder

knee. This knee carries a table having both cross and longitudinal hand feed. The grinder has a head and a foot-stock which can be removed when it is desired to clamp square broaches and keyway cutter bars. The head-stock comprises an index mechanism for use when grinding spline broaches, and a live center which is belt-driven from an auxiliary countershaft. A three-story cone pulley on both the main and the auxiliary countershaft gives three possible speeds to the live center spindle on the grinder table. The table is large enough to grind broaches 64 in. long and 8 in. in diameter.

The grinding wheel is carried on a spindle supported by a swivel-head which makes it possible to both grind the rake angle on the back of the broach teeth and to undercut the faces. The head swings on the column of the machine to any horizontal angle, and so permits the grinding of teeth machined at any angle to the axis of the broach, as well as the grinding of teeth at the customary 90 deg. to the axis. The grinding wheel spindle is belt-driven from the main countershaft. A pair of idler pulleys change the direction of this belt for any angle of the grinding wheel spindle. The whole swivel head mechanism is moved forward by a hand lever to bring the grinding wheel up to the tooth surface to be ground.

Training Men for Tractor Service Work

Service is an extremely important part of tractor merchandising. Lack of proper service has hindered tractor development on more than one occasion. The present article describes the methods used by one manufacturer in training service men for his dealer and distributor organizations.

By Norman G. Shidle

EFFECTIVE service is an important feature in the merchandising of tractors: some authorities believe it to be the most important. It is of mutual benefit to the manufacturer, the dealer, and the user that proper service be available when the need for it arises. And in the development of effective service facilities by the manufacturer lies the possibility for a greatly widened and improved tractor market.

In an effort to develop men capable of rendering the proper service, some tractor manufacturers have installed training schools for dealer and distributor service men. Through such a school it is possible, not only to make the service man thoroughly familiar with the product itself, but also to "sell" him on the ideals and methods of the manufacturing organization. As a result, the manufacturer gets a closer relationship with his dealers and at the same time insures service to the user along the lines best suited to a promotion of good will for the product.

An excellent school has been developed along these lines at the Midwest Engine Company in connection with the Utilitor tractor. The course is conducted under the auspices of the factory service department of the Utilitor Division. It lasts for nine days, each class comprising about ten men. During the course, the students are made thoroughly familiar with the various technical details of the Utilitor, are instructed in the best methods of making repairs, spend a number of hours in practical work both in shop work and on a farm adjacent to the factory school.

While service on a very small machine such as the Utilitor does not involve as many complexities as would arise in connection with larger units, a story of this course is specially valuable because it is possible to get an entire picture of the school and the various training activities.

The course is particularly adaptable to description in a short article, since it involves all the factors in a small way which might be necessary in larger scope in training men for work on a large machine.

Most of the men who take this course are already familiar with the fundamentals of gas engine design and

operation, most of them being dealer or distributor service men. The course is so designed, however, that salesmen and prospective salesmen, or men entirely unfamiliar with the technical phases of the tractor may also be included.

The school is in charge of a director who devotes his entire time to this work. It is supervised, however, by S. V. Harding, Service Director of the Utilitor Division. A description of the work in detail will indicate the thoroughness with which the ground is covered, taking into consideration the short duration of the course.

On the first day, after the new students have been enrolled, a general lecture on Utilitor service is presented. This brief talk introduces the men to the service ideals and aims of the company and forms a basis upon which the rest of the course is built up. The following paragraph from the first lecture indicates the kind of foundation that is laid:

"In addition to this education (of the user as regards his service obligations), the manufacturer group must maintain adequate supplies of spare parts at points easily accessible to Utilitor users, and it must have at hand men trained and qualified in the care, operation and repair of this product, whose services may be brought to the assistance of the Utilitors operating in the user's hands."

Following this lecture, is an illustrated talk on the principles of the gas engine. This talk traces rapidly the history of the combustion engine from its inception to the present state of refinement, and describes simply and briefly the fundamental principles of gas engine operation. The talk is illustrated by colored charts which present the material so clearly that it can be understood even by one comparatively unfamiliar with the functioning of gas engines.

A general survey of the plant is then made, the students being conducted through the various manufacturing departments and being instructed in a general way as regards the different operations.

The final part of the first day's work is taken up with disassembling the Utilitor, so that each student may learn the names and functions of each of the various parts. First, the instructor gives a talk on disassembly, taking

APPLICATION FOR MEMBERSHIP UTILITOR CENTRAL SERVICE SCHOOL				
NAME			AGE	
MARRIED			NATIONALITY	
No. OF DEPENDENTS			CHURCH	
STATE NATURE OF EXPERIENCE DURING PAST THREE YEARS				
EDUCATION				
8TH GRADE	HIGH SCHOOL	COLLEGE	SPECIAL COURSES	
DISTRIBUTOR	DEALER	SERVICE MECHANIC	SALESMAN	OWNER
EMPLOYER'S NAME		ADDRESS		
APPLICANT'S CITY ADDRESS		TELEPHONE	DATE WISHES TO ENTER	
MIDWEST ENGINE COMPANY				
Utilitor Sales Division			Service Department	

Application for membership in service training course



View in shop section of service school



The classroom of the service school

the machine apart to illustrate his various points. The students are encouraged to ask questions when any point is not clear, so that when this short lecture is finished, they should be capable of properly disassembling a machine themselves.

Following the lecture, each student is given a tractor and is expected to properly disassemble it. This he does entirely alone, the instructor, however, being present to answer questions and make explanations.

The second day begins with a lecture on Utilitor parts, illustrated in the same manner as was the lecture on gas engine principles. Following this talk, the students again go into the shop to actually do sub-assembly work. In this way they become familiar with the details of the various parts and become proficient, through actual experience, in assembling them.

The particular type of clutch used on this tractor is next discussed, first in a lecture and later in the shop. The students, after being taught the theoretical principles of the clutch are required to assemble and disassemble it. In every case, a clutch is given to each student so that he must do all the work on every unit himself.

The ignition and fuel system comes in for attention on the third day. The lecture on ignition which starts the day takes up the basic principles of ignition and explains the ignition system thoroughly in simplified terms. This lecture is followed by several hours of shop work on the ignition system.

The historical as well as the technical phases of the fuel system are explained to the students, the idea being to give them a broader knowledge and a more intelligent interest in the material things with which they are working each day. The parts and principles of the carburetor are discussed, questions are answered, and the entire matter made clear to every man. The last periods of this day are spent in reassembly of the entire machine. Each student again has a machine to himself and is required to assemble it from beginning to end.

Instruction is given in the proper methods of uncrating a machine at the beginning of the fourth day. It is possible for the dealer to uncrate the machine in such a way that the crate may be used over again. Improper methods, however, destroy the crate so that it is not fit for further use. For this reason an entire period is devoted to this phase of the work. After the lecture the students again go into the shop. The work done in the shop from this time on is likely to vary somewhat with the individual. Some men will grasp certain phases of the work more readily than others. In the shop work, each man works along the lines in which he is least proficient, so that he may have a clear and comprehensive grasp of all phases of the work when he has finished the course.

The lecture on hitches which follows, explains the various methods of hitching the Utilitor to the different farm implements. The students then spend several hours in making such hitches until each one becomes proficient.

A lecture on "trouble shooting" starts the work of the fifth day. In this lecture it is pointed out that three things are needed in order that an explosion may occur:

1. Pressure
2. Combustible mixture
3. Ignition

The students are then taught how to trace various troubles to a lack of one of these three essentials. Each man is given an engine which has been put out of order in some way. He must then locate the trouble and set it to rights. Several hours are spent in this work.

The "trouble shooting" work is followed by a lecture on the various power applications of this particular tractor. The men are taught the various ways in which the Utilitor can be used as a power plant. More practical work in "trouble shooting" follows this lecture.

The sixth and seventh days are spent "down on the farm." An experimental farm of about 17 acres is located within walking distance of the factory. Here the agricultural features of the hitches are demonstrated; the type of hitch best designed for a specific type of work is explained, etc. The students then make the various hitches, see the tractor used for various types of work, and operate it themselves under various conditions. Much of this day is spent in instruction talks and demonstrations by the instructor. The seventh day is a day of actual field work by the students. This day brings out the things that the student does not know and an opportunity is given him to clear up the cloudy spots in his knowledge.

The first period of the eighth day is an open conference with the director of the farm service department. A lecture is then given to show the best method of making a field demonstration, and of pointing out the outstanding features of the machine. A conference period follows during which the students may talk individually with the instructors concerning various phases of the work, and may go into the shop and work on some part of the tractor with which they are not yet thoroughly familiar.

Every student is taught how to run a motion picture machine. This firm has obtained excellent results through the use of motion pictures in advertising its product, and wishes at least one man in every dealer's and distributor's organization to be familiar with the operation of the picture machine.

The last period of this day is filled with a talk about spare parts, the necessity for a dealer's keeping on hand an adequate supply, the system of distribution used by

this company, and other phases of tractor service work.

On the last day of the course, the students make another trip through the factory assembly line. This time they are in a position to know all the parts and to understand the various operations which they see. It is, in a sense, a lecture tour during which the men ask questions and find out many new points which were not intelligible to them on their first trip at the beginning of the course.

A detailed lecture concerning the proper equipment necessary for a tractor service shop is given. The special tools necessary are named and described. When the student is through with this lecture he is able to go back home, start a service shop and intelligently order all the tools and equipment he will need to keep it operating efficiently.

The class is taken for a trip through the stock room. The man in charge of the stock room explains the stock-keeping system to them, points out the difficulties with which he meets, and thus makes them aware of the inevitable causes for delay which sometimes arise. This is not in the nature of excuses, but simply another method of getting the dealer's organization to understand the problems of the factory. The result has been a marked increase in the spirit of co-operation.

A final lecture by the service director, summing up the course and presenting the ideals and knowledge which the company hopes it has given the men, winds up the course. After this lecture informal conferences are held in which the students can ask and have answered any questions which may have come up and which they wish answered before returning home.

The results thus far obtained from this short intensive course have been excellent. It has resulted in a number of advantages to the company. Among the chief of these might be mentioned:

1. A better and more thorough knowledge of the product among dealer's service men.
2. A knowledge among these men of the best service practice for this particular product and a resulting betterment of the service rendered to users.
3. A raising of the ideals of service among the men who actually render that service to the user; a broadening of the vision and ideals of these men.
4. A better understanding by the dealer's organization of the factory problems, and vice versa. This makes for a smooth working organization throughout.
5. A personal acquaintanceship between the factory service manager and the various dealer service men. This is made possible by pleasant and close association during the ten days of the course. It is not only a personal pleasure for all concerned, but a distinct advantage to the efficient working of the service organization. It is an advantage that is abstract rather than material, but it is through that intangible human element that the best organizations are effected and the greatest tasks accomplished.

Several interesting points are brought out by this course from the standpoint of instruction methods. The instruction is given to more than one type of man, although a single type predominates. In order of the number which take the course, the following groups are comprised among the students in general:

1. Mechanics; men who are good artisans, but who have had little experience in listening to lectures or in taking notes. Men who are likely to grasp mechanical details rapidly and theoretical details slowly.
2. Salesmen; men being trained to sell the tractor; whose chief experience is selling; who are likely to grasp principles quickly and a technical practice less readily.
3. Executives of distributors' organizations; men likely to have the same characteristics as the second group mentioned, with the good points more highly accentuated.

To make the course adaptable to each of the classes, every subject is treated in simple form to begin with. It does not hurt those who are familiar with technical practice to renew their knowledge of fundamentals, and it enables the others to grasp the subsequent instruction. Then too, the latter part of the course, though definitely planned as to periods, allows considerable scope in the exact shop work to be done, so that the particular needs of each type of man can be adequately accommodated.

Insofar as possible the lectures are given early in the day; the first period is always a lecture. Thus the minds of the men are caught when they are fresh, and when they can most readily adapt themselves to the unusual ordeal of keeping the body still but the mind active.

When a man applies to enter the course, he is required to fill out the "Application for Membership" card shown in the accompanying illustration. When the man is a dealer or distributor employee, the director of the service school sends a letter, near the beginning of the course, to the man's employer, noting the arrival of the man and the prospects which he seems to have for successfully completing the study. In some cases, it may be obvious at once that the man does not have the requisite qualifications. Then the employer is notified in a frank and cordial manner. The man is allowed to take the course, but the employer then knows beforehand that he is unlikely to receive the maximum value from the training.

At the completion of the course, an examination is given. Those who pass it successfully are given a certificate of graduation. The service director then writes to the employer of the man another letter, reporting upon the work of the student during the course.

The school is conducted in three large rooms, one of them a shop, one an office, and one a classroom. These rooms are provided with the models, charts, classroom chairs, and other equipment necessary to provide the best facilities for such a course. The expense of conducting the course, providing equipment, instructors, etc., is borne by the company. The personal expenses of the student are borne by his employer.

To illustrate the thoroughness of the training, considering the very brief period devoted to it, a few sample questions from the final examinations are presented.

1. What is meant by ignition, how is it accomplished?
What is preignition?
2. What becomes of the heat generated during power and compression stroke?
3. What is correct method of lubrication of magneto?
Why should cylinder oil never be used?
4. What factors can be at fault to prevent the low tension current from completing its circuit?
5. Outline the Utilitor plan of distribution.
6. Explain thoroughly the Midwest service policy.
7. Name all publications in which you have seen national advertising of the Midwest Utilitor.
8. What function does the Utilitor clutch perform?
What type of clutch is used?
Has Utilitor separate set of transmission gears?

While these questions would not cause an engineer to think very long, it is evident that if a man is able to answer a majority of them correctly after a nine days training course, those nine days have been spent in very profitable effort.

This training plan is further carried out by requiring each distributor to maintain a similar course of training, conducted on a less elaborate scale, for his dealers. The dealers are also required to provide training for their own men as occasion requires. Thus the work of the central school is supplemented by two duplications. The main course, however, is always open to men from both dealer and distributor organizations, and draws many of its students from the first as well as the second.

Dealers Resentful Because of Expense on New Cars

This installment of our document on the relations of the manufacturer and dealers is confined to the dealers' opinions on assembly and inspection. As nine of the thirteen replies tell of heavy expenses, you can understand why the dealer is not cheerful on this subject.

By Clyde Jennings

MR. MANUFACTURER, have your cars been costing your distributors and dealers from \$50 to \$150 to put them in shape to be handed over to the customer?

No, this is not a foolish question. A lot of cars have been costing the dealers and distributors this amount and evidence at hand is that in many cases the factory has not in any way reimbursed the dealer for this expense.

In only four of the thirteen cases we will cite has the factory met this issue fairly. The four, you will note from a reading of the evidence, are dealers who handle only one car. Some of the others, you will note, handle more than one line.

A pretty bad situation, I grant you, and it is no wonder that some dealers and distributors are perfectly willing to change their lines.

It is one of the limitations of research that the results are never entirely up to date. We can obtain positive information only on what has happened and then, usually, only when it has happened long enough before to become a settled incident. It was for this reason that in a previous article we passed on to you a referendum on incidents that were ancient history. It would be very interesting to know to what extent the conditions reported in these replies have been corrected—now that the manufacturers have more time to give to details.

It is no secret that each manufacturer, as he reads these answers, is going to reflect in his mind that he is not the man referred to. But are you sure? How long has it been since you read the dealer complaint correspondence? It is to be hoped that all manufacturers who read these answers will read them with a perfect open mind and not influence himself as to his attitude. Here is the question asked the dealers to get these replies:

Numerous reports indicate that poor assembly by factories has cost in many cases as high as \$50 per car to put in suitable shape for customers and that the factories have not reimbursed dealer for poor factory work. Is this true?

Now we have taken the liberty of grading these replies from worst to best in a general way. Read these carefully, they are worth attention!

1—Our cars, particularly one model, have given us no end of trouble, and the service on this particular model has averaged us about \$150 a car. Our factory has not as much as replaced parts. They would simply state that the parts were worn and not defective, and we had to replace these parts free for service policy. Our dealer organization, which cost us thousands of

dollars to create, is in a most disorganized condition because of the trouble which this particular model has given, and being short of mechanics, we have simply been unable to give the dealer the help and co-operation which he should have, which burden should be on the factory's shoulders and not on ours.

2—The manufacturer ought to be ashamed of himself for delivering cars to the distributor and dealer which were only half assembled. The average cost to us for every small model Four that we have had delivered to us this year has cost us \$60 per car to put it in a salable condition. I have distributor

friends who tell me that it cost them \$120 per car to put them in salable condition, and when we mention this fact to the manufacturers they say that their policy is that they absolutely will not reimburse any dealer for labor. This applies also to labor for replacing defective parts.

I am glad to say that the worst is past, but there are still some reports that are very embarrassing to legitimate manufacturers. Here are a few that will cause any thoughtful man to ask if there is any such correspondence in his office:

3—Poor assembly by the factories costing as high as \$50, yes, even more, has been chronic with most manufacturers as well as the manufacturers with whom we do business. There is no question about this, and this is still continuing today, and the "buck" is passed to

THIS is the third of a series of manufacturer-dealer articles. These articles are intended to call to the attention of the manufacturer some of the conditions existing in the dealer field. They are not written for dealers.

We believe that it is time for better selling of automobiles.

We believe that errors can be corrected only when it is known that the errors exist.

We believe that much of the information in these articles will be real news to many manufacturers.

We believe that it is important that he should know these things.

There will be more of these articles—one of especial interest on the manufacturer-dealer contract.

the distributor and the dealer in each instance. There is no labor allowance given for rebuilding these cars and putting them in satisfactory condition for the customers. This obviously is very unfair. Factories will replace parts, but the transportation on these parts must be paid by the customer, and the labor charges for installing the same, even though the cars have seen little or no service. This matter should be remedied, and the factories under their guarantee should take care of this item to build up a reputation for themselves and also allow the distributors and dealers to make money. This is one of the worst features of the business.

4—It is quite true the majority of factories have given their cars very poor inspection, indeed, with the result that poor assembly has occurred in many cases. I believe that when you quote \$50 per car as the cost to the dealer for taking care of this poor assembly, you are putting it very low. I know of a number of cases where the amount far exceeds that sum. In some cases the factories have taken care of this bill, but have not done so in the majority of instances.

5—The poor assembly of cars by factories, undoubtedly, has cost the dealers considerable money to put cars in suitable shape for deliveries, and not a single case of reimbursement has come to my knowledge.

6—This is a fact. Not only have the assemblies been poor, but we have had instances of equipment being short when it was self-evident that the cars were loaded that way. We have had to buy two or three clocks, and so forth. We have had to tear down several engines because of tight pistons. The factory is absolutely arbitrarily taking a position that it cannot err nor can any of its employees; therefore, if they do not, by their own accord, send us a Back Order, we have to pay the bill.

7—My last records show that it cost me about \$75 per car to put the Blank in condition for customers, and we were never reimbursed one cent by the factory for labor. In addition to this, we have to pay express both ways on parts returned, but in most cases the parts were furnished free by the factory.

8—The assembly work in the aggregate has been poor. The inspection, as a rule, has been a joke, and it is acknowledged that most dealers before starting on their drive-aways inspect their cars before taking a chance on the road. However, our factories have made good any defect and have allowed us the credit to cover on the parts and, in some cases, the labor also was included in our credit.

9—It has been the custom ever since I have been in the business (11 years) for distributors to put the cars in condition to run at their own expense, and there has been very little change in the situation during the past several years.

Granted that you are a conscientious manufacturer, and that you have survived thus far, I am glad to say that there is better news coming. Very likely you had begun to think that you were in mighty bad company. But there are some automotive manufacturers who have a right regard for the morals of business. It is a great pleasure to pass these bits of testimony on to you:

10—We have had more or less difficulty from the condition referred to. No doubt, factories have been laboring under a very serious condition from a labor standpoint. We have had a great many cars come in that have been

taken into the shop before we could deliver them. In some cases on our Blank cars, we have had to spend as much as \$50 to condition them for delivery. We have found that these cases, however, are isolated, and in such cases we have taken the matter up with the factory, and in nearly all instances received entire satisfaction. We believe we are particularly fortunate in being connected with factories that have a very fair policy.

11—Poor assembly has not been a serious matter with us. Cars have been coming through comparatively O. K.

12—Our factories have co-operated with us to the last degree, in my estimation, in relation to anything that could be traced to poor factory work or poor assembly, as you put it. Two of our factories, on several occasions, reimbursed us for labor when it could be proven that the job was improperly done at the factory.

13—The Blank people prefer to shut down in preference to sending out badly assembled cars. We have experienced practically none of this, but have experienced delay in getting cars and waiting until they were properly assembled. We know, as a matter of fact, that lots of distributors and dealers have been put to the expense of a lot more than \$50 a car to get their automobiles into commercial condition, and that the manufacturer has not reimbursed the dealer.

Just a word more in closing. It is to be hoped that manufacturers will not remember the last four testimonials and forget the others. Also it is to be hoped that they will not remember only the first two.

Our business is a great, big, fine business, and we have the foundation for a bigger and finer business, but some things that are happening in this structure are not entirely helpful. We must tear out the defective material put in during the last few years of stress and replace it with honest intentions, well carried out.

The strongest bond the manufacturer should weave should be that with the dealer. YOU cannot hope for success unless your dealers are for you and with you, heart and soul.

We are not yet through with this manufacturer-dealer situation.

THE trade mark law of 1920 has materially softened the harsh and apparently unreasonable conditions of the Trade Mark Act of 1905, under which so many trade marks constantly used in this country could not be legally protected. The old law did not permit of the legal registration of a trade mark that was descriptive or geographical. Such a trade mark might be adopted and used in this country and respected because of the popularity given it by advertising, but as it was not legally registered in this country any one could steal it for use in another country. Under the new law, such trade marks can be registered. An automobile, truck or tractor may now be registered under a trade mark that is descriptive or indicative of the city or State in which the vehicle is made. The greatest advantage of this law is that when a trade mark is so registered in this country, it cannot be as easily stolen in a foreign country as under the act of 1905. But to devise a trade mark that will be attractive and command respect in all countries is quite another matter and here is where the trade mark experts can well serve a firm that is going into the world trade field.

Some Interesting Bits of Information on Foreign Trade

No one has compiled a comprehensive directory on Foreign Trade and probably no one source of information will supply your needs. It is only by carefully compiling all bits of information that fit your case that you can study your export problem with the care and interest it warrants.

THE annual meeting of the National Foreign Trade Council, which will be held in Cleveland May 4 to 7 inclusive, should be of especial interest to automotive manufacturers this year. Surely no one will question the fact that the export trade has been an important factor during the past year, and there is every reason to believe that it will be even a more important factor in the years to come.

Export trade has peculiarities. A man versed in domestic trade is not always entirely equipped for export selling. There are many crooks and turns that must be learned and mastered. Experience is very slow in export trade, chiefly because the turnover is slow. It requires a long time to learn whether or not you have offended a customer. So, if you are in haste to get into foreign trade, it is best to learn by the experience of others. The meetings of the Foreign Trade Council serve that purpose.

Batteries Abroad

AN interesting development in foreign trading is the increased attention being given export trade by the storage battery companies. Several of these companies are establishing export agencies in many countries where sufficient American cars have been sold to warrant this attention. It is even more significant that these companies are establishing export agencies only where the agency will provide adequate service facilities.

The battery companies intimate that they have not received full support from the car manufacturers. The car exporter, it appears from the data in the possession of the battery exporters, has not realized fully the importance of primary information that should accompany cars shipped abroad. In some cases cars have been exported with wet batteries, instead of the special dry battery that is manufactured for export trade. As a result, when this car is turned over to the owner four months after it has left the factory, the battery is impotent. This is quite a serious defect in a country where the battery is so little understood as in most of the countries to which cars are exported. It not only is a blow at the battery maker, but what must be considered more important, is a blow at the confidence in the car and, generally speaking, to American cars as a whole.

Optional Equipment

IT is interesting to note that some very careful merchandisers of cars are going into the export business with a considerable understanding of the problems before them. Among the cars exhibited in New York during show week was a Marmón, which was designed especially for export trade. This car was at the Marmon dealer show room. The most marked feature of the car was that it was a right hand drive, but there were other optional

features, designed to meet the wants of the public in the various countries of the world where the export division of the Marmon sales department may place the car.

Optional equipment is quite necessary for a successful foreign business. The need of right hand drives and magnetos is very well known. The matter of colors is also quite important. In only a few countries in the world is the buying public content to ride every day and on all occasions in the funereal appearing cars that predominate in the United States.

Car Census in Sweden

AN error in an article about Sweden as a market for automobiles, which was published in AUTOMOTIVE INDUSTRIES Dec. 2, has brought to us a number of letters, which go to show how seriously an error in AUTOMOTIVE INDUSTRIES is regarded, and which bring to us considerable information. These letters come from The Scandinavian-American Trading Co. of New York, Fiat Societa Anonima-Torino, Turin, Italy, and Capt. John Neren, editor *Motor*, Stockholm.

These letters all call attention that the figure of 70,000 is entirely too high for the number of automobiles in Sweden. This figure was printed as coming from the French Chamber of Commerce in Sweden. It is probable that in transmission of this information a typographical error made 7000 grow to 70,000.

The difficulty in reading this article by the correspondents was that the figure of 7000 is not high enough, and the mistake was not obvious. These letters inform us that on June 1 there was a census of motor cars in Sweden and that the number reached 8506. The Scandinavian-American Trading Co., which represents The White Co. in Sweden, adds that recent information indicates that the Jan. 1 registration will show between 13,000 and 13,500 cars and trucks in that country. This great increase is due to the heavy importations during 1920.

The details of the June 1, 1920, census were:

	Country	Stockholm
Cars and trucks	8,506	2,137
Motorcycles	9,059	1,015

Another bit of information in these communications is that the import duty on automobiles into Sweden is 15 per cent of the value c.i.f. at Swedish port, consequently this is inclusive also of the freight and insurance, railroad and boxing charges, and not as stated in the translated article.

Defense of American Car

AMERICAN car manufacturers who export to Australia have a firm friend, the editor of *The Australian Motorist*. This comment is brought out by an article which appeared in the Dec. 1 issue of that publication.

The comment was based upon a criticism of the Adelaide show, written by an anonymous correspondent. The editor apologizes for printing such a communication, but he interlards between the paragraphs of this criticism his own view of the points made by the critic.

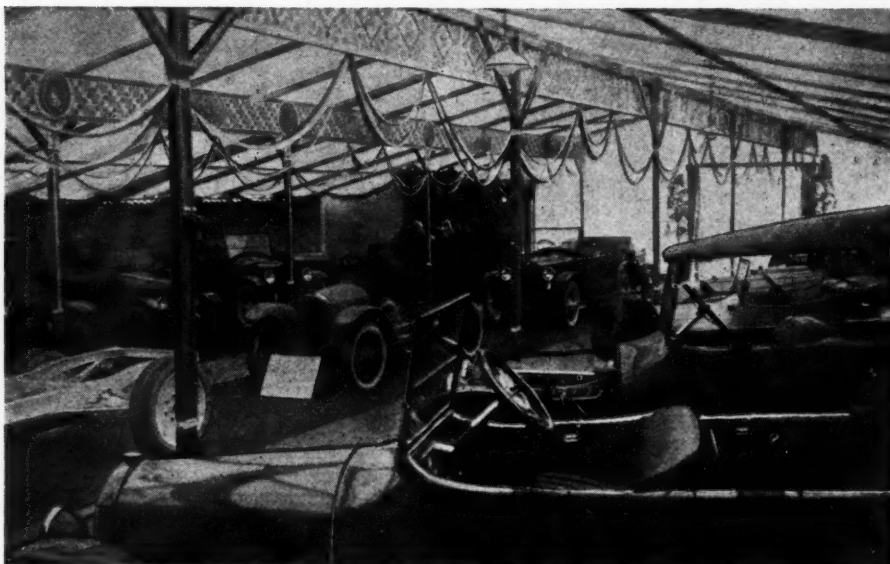
The critic is one of those persons who can be classed as pro-British. He apparently believes that Australians should not buy cars until the British manufacturers are ready to supply them. He let his antipathy for American cars carry him past the facts, for his statement that the show was financed by Americans and displayed more American cars than British are met with a mere statement of fact. We will reprint one paragraph of the criticism of the editor's reply as a type of the controversy.

The critic wrote:

"The British side of the show, though so limited in numbers, came in for a good share of attention, and undoubtedly the agents will be able to report business by the end of the week, in spite of the big difference between the cost of British and American cars. That the British car will hold its own again, and in the near future too, can be guaranteed. The British manufacturers have not recovered from the effect of the war yet, and may not do so for another season or more, but taking into consideration the many advantages America had while British interests were fighting the wars of the rest of the world, it is a marvel that we could even make a show at all."

The editor replied:

"When the British manufacturer gives Australians motor vehicles which come within the scope of the purchasing power of the Australians then British builders will get all the trade. The reason that fewer British cars are being purchased than American is due to the following: (1) A mail contractor with small capital cannot purchase a motor car for £1250, but he can finance one at between £300 and £650. (2) The farmer with heavy demands on his bank for agricultural machinery, fertilizers, and perhaps seed, when the drought catches him, cannot be expected to lay out over £1000 in a luxurious mechanical road vehicle if one costing a little more than half that sum will do the work satisfactorily. A Rolls-Royce limousine loaded with fencing wire on an outback sheep run would be an absurd situation. The British car has always held its own in its class. The British never have catered for the purchasers of purely utility cars. The policy of the British builder has always been to construct a high-grade piece of mechanism, costing more, which has found a great market in the wealthy old countries of Europe and Asia, and even America; and also to the full extent of the purchasing power in Australia. No one questions the ability of the British manufacturer to hold his own in his own class. We did not see during the war any rush on new makes of American cars in Australia. The motor traders in Australia had two alternatives—sell what they could get or close up their businesses, sack all hands, and destroy a great industry. No British or American capital is invested in the Australian motor industry. All the hard cash and hard labor in developing the trade and putting British cars on the market were all Australian. Before the war it was difficult to get prompt delivery of British goods. We don't agree that it 'is a marvel that we can make a show at all.' It is two years since the armistice



Some importers of American cars work on big plans. This photograph indicates the extent of a "private exhibition of American cars," staged in Copenhagen by K. W. Christensen, agent there for Buick and Hupmobile cars and Denby and Clydesdale trucks. Forty vehicles were exhibited and there was music and everything to make a show attractive

was signed, and if our correspondent will examine British Board of Trade figures he will find that in most British industries pre-war figures have been exceeded. Only in the motor trade are there signs of delay in recapturing pre-war export trade, and this is due to the absorption of output in the home market."

Postage on Export Mail

MANY companies which have a central mailing department to handle all outgoing correspondence have found difficulty in getting the right stamps placed upon their foreign letters. In the rush of handling a large amount of mail, a foreign letter generally is included in a bunch destined for domestic points and the result is that a two-cent stamp is placed on the communication going to the Argentine or perhaps Italy. The result, of course, is generally unfortunate. The firm receiving the letter not only has to pay the missing postage and any penalties that may have accrued, but also obtains a very poor impression of the manner in which the offending company handles its foreign business.

One way of combating such mistakes is to have the word "foreign" or the letter "F" written or stamped in the upper right hand corner of the envelope where the stamp is to be placed. When the envelope is addressed, the word or letter is written either on the typewriter or pencil or a rubber stamp may be provided for this purpose. Then, when the letter goes to the mailing department to be stamped, the worker's eye is caught at once with the mark where the stamp is being placed. Thus warned, the proper stamp is affixed and the evidence of this bit of efficiency disappears with the certainty that the receiver of the letter will be unable to exclaim that "another American company has shown carelessness."

A RECENT report of the National Association of Corporation Training states that out of 117 companies from whom information was asked, 36 were making more or less extensive use of rating scales in employment and personnel work. Some twelve companies used such scales to apply to all positions; seven used them for executives only; five for salesmen; five for foremen; two for agents; three for telephone operators, and one for all employees on a salary basis.



The FORUM



Transmission Brakes

Editor AUTOMOTIVE INDUSTRIES:—It is not very often that I find myself opposed to the views expressed in an A. I. editorial, but I cannot help feeling that the recent comment on transmission brakes missed a few points of some importance.

It is my conviction that the best service brake is a transmission brake, when all things are considered, and this is not based on old European prejudice; I hope that I have very little of that left in my make up.

Taking the advantages of the service transmission brake as they appeal to the user: First, there is its great power with small exertion; second, there is extreme ease of adjustment, and third, there is much easier replacement when relining becomes necessary.

Against these unquestioned good points there are three conventional objections: That the brake is dangerously powerful, that it over-stresses the universal joints and that it puts excessive loads on the bevels in the rear axle.

Now, as a matter of fact, it is high speed rather than high unit pressure which is bad for universals, and as for the driving gear pressures, a properly designed brake does not give deceleration greatly in excess of the acceleration on low gear while the total length of time during which a transmission brake would be "hard on" never exceeds a few seconds per hour of driving.

As to the absolute power, this is a question of design. Most transmission brakes, whether American or European, are not particularly well thought out, just as most rear wheel brakes are not of the engineering quality to be expected from that of the rest of the car to which they are attached. Brake design generally has been neglected very much indeed, and has been assumed to be easy, whereas it is really not easy at all.

Many transmission brakes have been made too powerful, because, owing to the compactness of everything, very slight pedal movement is sufficient to set the brake. This can be compensated for by proper proportioning of the various levers or by the introduction of a spring link, positively limiting the pressure that can be applied to a predetermined maximum.

Incidentally the hand-operated transmission brake is far more liable to be too powerful and is far more likely to do damage owing to the facts that the leverage is very great and that the ratchet locks the brake. One of the greatest charms of a good transmission brake is its delicacy of "feel" to the foot, especially when braking on very slippery roads.

While I am altogether in accord with your editorial in its condemnation of the conventional external rear wheel brake it has a point or two in its favor which ought in fairness to be mentioned. First, if both brakes are to be rear wheel brakes, then the double expanding brakes are a little heavier. Also some brake linings are apt to glaze if not occasionally fed with abrasive material. My experience has been that linings with much brass wire are very liable to glaze if perfectly inclosed. Another drawback is that to reline an internal brake costs more than to do the same job on an external one, owing to the necessity for removing the wheels. This last argument, for what-

ever it is worth, must also be put in favor of making the transmission brake the service brake, if it is used at all, since a transmission brake is easier to remove and reline than any pair of rear wheel brakes.

There is little doubt that ideal braking is obtained from brakes on all four wheels. Properly linked, such brakes will never cause skidding and will be more powerful than even the best of transmission brakes, but the mechanical difficulties are considerable.

In the hands of the average owner or repairman the rear wheel brakes on most cars soon get a little irregular in action. The equalizing gear gums up and is never oiled and so forth. In most front wheel brakes the operating system is such that oiling and *intelligent* adjustment are essential, and the user is calling out for less parts to look after. A transmission service brake does simplify maintenance and gives better braking than the conventional system. It is also cheaper by a long shot than four wheel brakes. So, while the ideal system may have a vogue on costly chassis, everything points to the transmission brake as being the best choice for the medium priced machine.

A. LUDLOW CLAYDEN.

Some Suggestions to Manufacturers

Editor AUTOMOTIVE INDUSTRIES:

Why don't more car makers install the invaluable gas saving shutters on the radiators?

Why don't they give a man who drives his own car and takes long trips in the summer, or any other time, some protection against the petty thieves who infest garages by putting locks on all door pockets?

Why don't they also protect Mr. Owner from the "smart" garage man who lifts the hood and "adjusts" the carburetor because the car won't start immediately on a cold morning, said protection to consist of good locks on the hood at a cost of \$2 or \$3?

Why don't they put the horn where there is some chance of a truck driver hearing it, that is, under the left headlight, so that the sound will be thrown forward without interference, and deflected to the right?

Why don't they try out some of the several hundred devices that will cause the headlights to turn with the car so that the road is always lighted even on sharp curves, at least as far as the driver can see around the "bend"? A device of this kind should, in my opinion, be non-operative in the day time, by the turning of a screw, and when in operation only the lamp on the outside of the curve should turn inward on the curve.

H. C. MORRIS.

Washington, D. C.

A Book on Carburetion

WE have recently received copy of the second edition of a book entitled Carburetion in Theory and Practice by Robert W. A. Brewer, Crosby, Lockwood & Son, Publishers. New matter contained in this volume includes appendices summarizing data from papers by Professors O. C. Berry and C. E. Lucke and G. H. Baillie.

Wages and Working Hours Are Different Problems

Recent reports indicate that some manufacturers are coupling demands for wage decreases with demands for longer working hours. Fatigue cannot be swept away by fear of losing a job. Proper working hours depend upon sound investigations and analyses. They comprise an entirely different problem than that of wages and should be treated separately.

By Harry Tipper

IN the information which has been received lately concerning the notices by employers as to reduction in wages, it is interesting to note that in a number of these cases the demand is made not only for a reduction in the wages, but for an increase in the number of working hours from eight to ten, from eight to nine and from eight to twelve. This would indicate that, in the minds of many manufacturers, the present is a good time to try to bring back the conditions which existed before the war. It also indicates that in those cases the reason for the cut in wages is not entirely a case of labor surplus in their particular establishment.

There are two elements to be considered in the question of hours apart from the demand of the labor union or the worker, and entirely apart from the custom which has been established in connection with an industry.

On much of the work which is done in various lines of industry, the investigation of the medical profession and the engineers working with them have established a definite relation between the fatigue and the number of hours in each day, so that the production is not actually maintained day after day on an increased scale in proportion to the number of extra hours worked.

The question of fatigue has been occupying the attention of some of the engineers and some of the industrial medical men, but the factors which enter into this fatigue have not been established thoroughly and the results are not entirely conclusive. However, it has been observed that there is a very definite limit to the number of hours which can be worked economically on any given class of work, and these limits vary according to the condition and character of the work.

There is, of course, a considerable variance in the actual fatigue established in the individual case and it is necessary to secure an average from a number of cases in order to determine the general conditions governing that kind of work.

Previous custom is not of much importance in this respect, as the earlier investigation did not deal with the human side particularly, and the knowledge of the human frame had not reached the point where we could determine fatigue with any reasonable exactness or know anything about the factors which enter into it. The bibliography of production is very barren of information on this subject, and it is necessary to go to the medical library to get the best work which has been done upon this matter.

Nevertheless, sufficient has been accomplished to show that the fatigue established by the working period bears a direct relation to the length of the period, and when it is accumulated to a certain degree, it has a tendency to carry over so that the efficiency is not as great at the start of the following day. This, of course, is particularly true in the highly repetitive, monotonous work which requires concentrated effort of mind and hand upon a few rapid operations, but it is true of all classes of work, although the length of the required period varies.

The extension of a half hour in the working period is sufficient to accelerate the production drop very rapidly in the extended period, and it is a question whether the production increase secured in the period of extension is sufficient to justify the operation being continued that length of time.

These manufacturers who are demanding a return to the ten and twelve-hour day without having considered the matter apparently any further than their desire to establish pre-war conditions, are forgetting the fact that the cost of production is a relation between the cost per hour and the production during the same period.

The idleness of machinery frequently costs a great deal more than the idleness of men, and it is better to close down the establishment rather than to run the machinery at a production which is not sufficient to pay the interest charges on the machinery operation.

This is not an absurd picture, as investigations have shown in past years similar conditions existing in industries where long hours have prevailed, without regard to the character of the work and the extent of the fatigue established during the working period.

Sufficient attention has not been paid to the investigation of production curves and the effect upon these of a small decrease or increase in the working period itself. And practically no investigation has been made as to the effect of a long working period, day in or day out, upon the attitude of the worker, his incentive, and the demand for the establishment of a minimum pace. The object, of course, of all operations in industry is to establish the minimum cost per piece in production, and this object is not always to be determined by a calculation of the rate, the hours of work and the average work per hour. There is too much difference in the capacity of the man and the amount of work he is supposed to do

under conditions which do not tend to bring out the full potential power.

It is not so long ago that several industries changing from nine to eight hours found production per man to be the same for the shorter day, and it is interesting to note, that with the new arrangement between the British coal miners and the government, although the hours have been materially shortened, the miners are showing the increase which will justify the wage increase.

It may be that industry will find that a greater number of shifts at maximum capacity with the same machinery will permit of a better production ratio cost than the present method. At any rate, the subject of the hours of labor economically of most value is too much a matter of investigation, analysis and consideration of the medical and industrial factors involved to make it a matter of argument with the workers because the manufacturer happens to have the advantage for the moment.

The question of wage reductions is one thing; if the cost of the articles themselves will not justify the wages that are being paid, it is necessary that those wages should be reduced. The question of hours is an entirely different matter. This is not merely a matter of extending the amount of production. It might be of no value to the manufacturer who paid hourly wages. The only advantage will be in the case of the manufacturer who pays by the day and who hopes to secure a sufficient amount of extra production in the hour or two hours demanded, to pay for the running of the plant during the extra period.

The circumstances under which these demands have been made do not indicate that the manufac-

turers' investigations have clearly demonstrated the length of working period which would be economically sound for his factory, and it is unlikely that any such investigations have been made as they are unusual and most factories have not attempted to examine the question from this standpoint.

Fatigue is not something which cannot be overcome by fear of the job and it is not swept away simply because the conditions are to the advantage of the employer. It is definitely related to the effort in character and extent, and the length of the period through which that effort must be made. It is just as definite in its consequences, and while it depends to some extent upon mental factors, the result is physical and finds its expression in a decrease or limitation of production.

It is not a question of labor politics or the demands of labor, but it is a question entirely of sound economics and the best economy to the manufacturer. The reason it has had so little attention is that the average manufacturer has not studied the investigations which have been made and the average engineer has not had the opportunity to go into it as it affects the production of the plant.

These changes which are suggested in various localities in accordance with information received, may or may not be justified, but their wisdom is not indicated by the circumstances and it is a mistake to tie up a demand for longer hours with a wage reduction at the present moment. The two things should be treated as different matters and approached in different ways.

Touching Bottom in Seeking a Basis for Wage Payments

WITH numerous factory representatives gathered in one place, it was possible during the New York show to ascertain with some degree of accuracy the general action being taken concerning wages in the industry.

An examination of reports from twenty-two representative automobile concerns, published in a recent number of AUTOMOTIVE INDUSTRIES, shows that eleven of these firms have reduced wages and that eleven of them have not reduced wages up to the present time.

The wisdom of reducing or failing to reduce wages just at this time cannot be finally determined as yet. The real test of the judgment displayed will come later when production is normal and good workmen are in demand. It will be very interesting to the student of industrial affairs to note the production and labor turnover results obtained by the different firms at that time, and in the light of those facts to interpret the wisdom of cutting or failing to cut wages at this time.

There is no disputing the fact, of course, that wages will inevitably fall with the cost of living, but there is some question as to whether they should follow or precede a definite change in that respect. Food and lodging are the two largest items of expense in most families, and while the former has dropped somewhat, there has been no change for the better in the latter. And with rent costing many one-fourth to one-third of earnings, it must be counted as a large factor in living expense.

Wages took a tremendous jump during and after the war, but so did the cost of living, and wages followed the cost of living up—they did not precede it. Moreover, in discussing the present wage situation, it is not feasible to lay undue emphasis upon the percentage of rise

in wages since 1914. Before the percentage of rise means anything, it must be established that the relation between wages and the cost of living was a just one in 1914. Undoubtedly it was not in very many cases.

If a certain class of workman was receiving in 1914 much less than was just, he cannot in fairness be expected to justify a decrease now because he has experienced a rise of 100 per cent since 1914. It is manifestly absurd to argue the question of fair wages upon the basis of how much wages have increased since before the war, because it is by no means established that the wage basis at that time was fair.

The difficulty with wage arguments and adjustments lies in the fact that they are placed upon an unsound and unscientific basis. Never in the history of industry have wages been determined upon a fundamentally sound basis; and they never can be until the various factors, human as well as mechanical, which are involved are more thoroughly studied, investigated and understood.

"Until we are willing to take production service as a basis of reward and to analyze that service so that it can be determined in its individual relations," wrote Harry Tipper recently, "wage systems must continue to be arbitrary and in themselves ineffectual in inducing the worker to put forth his full effort in production, incapable of removing the conflict which exists at all times, and insufficient to provide a reasonable measure of justice for all workers."

"Of all the systems for general wage payments being used at the present time the ones which are predicated upon the relation between the individual and the quantity and quality of his production, are the most effective in their general application."



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Why Not a Competitive Fuel Economy Test?

THERE are indications that a well-organized road test in which suitable prizes would be awarded for the cars that make the greatest mileage per gallon of fuel would attract many entrants and wide engineering as well as popular interest. Such a test would, of course, have to be run under carefully drawn rules which would take into consideration the size and load of the car, and would, to be of greatest value, have to be run under careful supervision to prevent freak methods of driving which no one would consider following in the normal use of a car.

Some manufacturers, especially those who build cars with air-cooled engines, consider that they are in a class by themselves when it comes to getting maximum fuel economy, but there seems to be little doubt but that a well-designed water-cooled car of equal weight could equal if not surpass the performance of the air-cooled car, for it should be able to operate with higher compression ratio, and perhaps

a better load factor than the other type, while with proper control of water temperature the cylinder walls need not be unduly cool.

However this may be, under intelligent rules there is opportunity for a competition that would prove instructive, and, we believe, thoroughly worth while. Such tests at least bring out possibilities or establish marks at which to aim in commercial practice. Whatever their advertising value might be it would be of small moment as compared to the engineering stimulus that should result.

We shall be glad to hear from engineers as well as manufacturers who would be interested in or lend their support to such a competition. Comments as to the rules which should govern an event of this character will also be welcomed.

The Chicago Show

THE increased buying which the opening day of the Chicago automobile show made evident is but a concrete expression of improved sales conditions that began evidencing themselves soon after Jan. 1 and are continuing. In former years the increased wave of buying set in motion by the show continued into the spring and summer selling season with increased momentum but there should be careful watching of the show stimulation this year. In two cities, Los Angeles and New Orleans, the show stimulation failed to continue as formerly. Following the New York show, the Gotham dealers have experienced increased sales and manufacturers will do well to follow closely each week the influence of the Chicago show. It yet remains to be definitely established whether or not the wave of sales due to the shows will grow into an appreciably increased volume of business. It should not be taken as an established fact that such will necessarily follow.

The show circuit so far—and reports from distributors from the country—establish the fact that there are two classes of interested visitors:

FIRST, those that have money but are carefully conserving it and are intelligently studying general conditions. SECOND, those that are temporarily embarrassed due to lack of employment or shrinkage of resources and looking for future information.

It is the lower-priced cars that are most affected by the lack of buying capital. It is in this class that reduced production will be noticed during this year.

Among distributors there are wide differences of opinion regarding price changes. The policy to be pursued is largely individual with different organizations. Several companies, that have made substantial reductions in the past four months and are giving rock bottom values, are not only going steadily on with a manufacturing program but the cars are selling generally. The public seems to be conscious that they are giving good value for the money. Others cannot make price alterations, due to stocks in dealers' hands and heavy inventories. There are sections of the country where the scarcity of money is such that any price reduction would not stimulate

sales because, despite the reduction, the money scarcity would prevent buying.

The Ford situation is creating much discussion and a good deal of confidence is given to the opinion that Ford will have to increase his price or resume production on a 100 per cent basis, and that an increase in Ford price would have a very stabilizing influence on the industry, proving to the doubting Thomases that the bottom has been reached on a number of cars. With so many out of the buying market in the low price field, a resumption of 100 per cent production seems improbable.

The Chicago show is offering the greatest opportunity for studying conditions, but the study will have to be continued for weeks after the show is over. Most manufacturers are going to resume production on one scale or another as a result of the Chicago show and are not placing much importance on such local shows such as those in Minneapolis or Kansas City.

A Factory Service Manager's Task

THE recent meetings of the factory service managers have brought out one point that should make for better service for automobiles in the future. An increasing number of factory service managers are listing for their several service stations the tools that can best be used for repairs on the car with which they are chiefly concerned. In many cases it is necessary for the service manager to design and practically manufacture certain tools so that his car can be serviced at a cost comparable with the service of competing cars. Recently Paul Williams, service manager of the H. H. Franklin Mfg. Co., classified the tools that must be listed as follows:

- 1—Commercial wrenches (this includes such wrenches as standard open end and pipe wrenches).
- 2—Specialty tools. These are made by companies making special automobile tool equipment; such as valve grinders, etc.
- 3—Tools required for the particular make of car the distributor is handling.

If service managers generally would interest themselves to this extent in their service stations, service would begin to look up. It is especially the task of the factory to see that the local service man knows how he can most economically do the work brought to him by the owner.

Thrift Campaigns in Factories

A CAMPAIGN is being carried on to induce manufacturers to institute thrift departments in their factories. In the main, the suggestion is that Liberty Bond campaigns be repeated. It has been suggested to AUTOMOTIVE INDUSTRIES that we endeavor to persuade different automotive factories to enter into a competition to determine which can sell the largest proportion of securities to employees.

But we are not ready to do this. The disappointments of the Liberty Bond campaigns are many. The chief consolation is that it was a patriotic effort. Whatever the results, they were justified by the

emergency. The bitter taste is due to the market price of Liberty Bonds since they were sold. Imagine what the impression would be if a campaign was waged in a less worthy cause. Some companies that last winter sold heavily of their own stock to employees on part-payment plans have had a serious time in explaining what has happened, especially when it was necessary to lay off or discharge the purchaser.

But we believe in teaching thrift to workers. It would be a very fine thing if every worker owned some securities, or had other negotiable wealth. You all are familiar with the arguments and there is no use repeating them. We think the idea of inculcating thrift is a splendid one, but we would proceed on low gear.

One man who is prominent in this campaign has stated his reasons for favoring such a campaign very differently from the usual thrift promoter. He says that industry to-day needs much money and that, because of the surtaxes on incomes, this money is not going to be forthcoming from its usual sources—the monied men and women of the country. Therefore, we must find new sources of wealth. The small saver is next on his list. So he suggests that each manufacturer would only be helping himself by inducing his employees to buy.

Very good. But can you assure yourself to-day of an investment that will remain of sufficient value for you to recommend it to the small and more or less uninformed purchaser? It might be well for manufacturers to teach thrift and to encourage savings, but he should be very careful what securities he recommends. Perhaps the establishment of a thrift office, where individuals will be advised as to possible investments, would be best under the circumstances.

The project is a very commendable one if it is carried forward with sufficient caution.

Bankers Recognize the Automobile as a Necessity

IT is interesting to note the worth while comments of bankers concerning the automotive industry, now that they are taking an active part in the financing of our operations. George C. Roberts, the eminent banker who spoke at the Society of Automotive Engineers' dinner during the annual meeting, discussed the "necessity of automobiles" in one sentence. He said, in effect: "The automobile has proven that it is a necessity because no man who has owned one will now be without a car." Slowly the men who have power in financial circles are putting themselves on record in favorable opinions.

A STRONG appeal is being made by the National Foreign Trade Council to members of Congress not to reduce the appropriations for the promotion of foreign trade. The automotive industry should be sympathetic with this promotion. O. K. Davis, secretary of the National Foreign Trade Council, 1 Hanover Square, New York City, can tell those interested how they can best assist.

1920 Exports Double Former Year

Gain of \$154,000,000 Largest in Industry

Trade Balance Immensely Favorable to Country—Returned Vehicles Total \$11,511,995

WASHINGTON, Jan. 31—Analysis of statistics prepared by the Bureau of Foreign and Domestic Commerce to-day shows that 1920 was the greatest year in the history of foreign trade in automotive products. Exports of automobiles, trucks and automobile parts more than doubled in value in the twelve months period ending Dec. 31, 1920. Sales of passenger cars on foreign markets increased by \$91,555,394, the total value of the 142,508 cars being \$165,255,921. The 29,126 trucks shipped abroad last year represented a value of \$46,765,781 or an increase of 13,641 trucks in excess of 1919 shipments and an increased value of \$11,340,344. Imports of 926 cars were valued at \$1,026,518, an increase in quantity of 809 cars and \$903,493 in value.

There were but two instances where automotive products declined in volume or value. Shipment of airplane parts fell from \$3,249,226 to \$554,375, notwithstanding the fact that exports of airplanes doubled in value. Sixty-five planes sold overseas last year were valued at \$598,274 as against 44 machines with a declared valuation of \$215,300 in the preceding year. A slight drop in the volume of marine gas engines was reported, exports for 1920 amounted to 9616 engines valued at \$3,283,341 as compared with 10,485 engines valued at \$4,363,538 in 1919.

The official figures make clear the fact that the American automobile manufacturers are effectively cultivating foreign markets for their products and the steady and marked gains in this direction indicate that the domestic depression is but momentary.

Import Business Prosperous

There are unmistakable signs that foreign manufacturers have enjoyed a prosperous trade in this country during the past year. The resumption of automotive manufacturing abroad and the careful cultivation of the American market made but little difference in the consumption of American products. The combined exports of automotive products represent a gain of approximately \$154,000,000. Imports of automobile parts other than tires for 1920 amounted to \$1,252,250 as compared with \$278,003 last year, an increase of \$974,243. The total imports of automobile and automotive parts were valued at \$1,877,736 or a small percentage of the exports.

The year of 1920 witnessed the return

in large volume of American cars and trucks to point of manufacture. The records show that 4959 vehicles with a valuation of \$7,921,540 re-entered the country without an assessment of duty. This amount is nearly double the value of cars returned in 1919 when 1656 machines carried a valuation of \$3,590,455. The business of returning cars to this country fell off in December, 1920, for there were only 42 automobiles valued at \$66,041 returned free as compared with 159 cars valued at \$390,780 in the same month in 1919.

J. Allen Smith Heads New Car Corporation

SYRACUSE, Jan. 31—The Nera Car Corp. is under process of organization here. It will be headed by J. Allen Smith who recently resigned as president of the New Process Gear Corp. and the United States Light & Heat Co. and as vice-president of the Willys corporation. He will be associated with Carl Neracher who also has held an important position with the New Process Gear Corp. Smith will be succeeded at the New Process Gear Corp. works by Layton R. Burt of Rochester.

Plans for the Nera car which the new company proposes to construct in this city, have not been announced, but it is understood it will be a vehicle especially designed for commercial work and will be ready for the market some time in the next six months. Neracher is the originator of the vehicle which is not entirely unlike an English invention largely used abroad.

Special virtues claimed for it are its exceptionally light weight and economy of operation. The promoters believe it will supplant many of the lighter delivery trucks now in use. Those who have seen the Nera car say that it is a cross between a motorcycle and an automobile and that it will not weigh more than 200 or 300 lbs. It will be capable of a speed of 30 miles an hour.

STEEL PRICES UNCERTAIN

YOUNGSTOWN, OHIO, Jan. 29—Steel prices and steel plant wage rates are still very much unsettled and uncertain. Officials of the larger independents and of the steel corporation properties are unable to forecast conditions in the valley, although there is no note of pessimism. New business is not in the volume that has been confidently expected, however.

BIG MARKET SEEN IN CHINA

BOSTON, Jan. 31—There is a big field for the sale of motor vehicles in China, according to Prof. Marshall L. Perrin of Boston University who has recently returned from a tour of that country.

Propose to Dump 5000 Trucks Here

Slough Company Finds No Market in England for U. S. Used Army Trucks

LONDON, Jan. 21—(*Special Correspondence*)—The Slough Trading Co., headed by Sir Percival Perry, former Ford manager in England, expects to sell in the United States a very large number of rebuilt army trucks and passenger cars, which were manufactured in the United States, and which were bought up at a ridiculously low price. It is understood that at the beginning of the year the company had on hand 10,000 of these vehicles and it hopes to dispose of approximately 5000 trucks in America. Many of the trucks are Packards and Rikers, but the majority were made in the Peerless factory for the British government during the war.

The Slough company's stock is going very slowly in this country as there is practically no demand at this time. As evidence of this situation, it is current gossip that if a man goes down to Slough with 100 pounds sterling in real money in his pocket, the gates are locked and he is not allowed to go out until he has bought something, and that something is quite likely to be a rebuilt 3-ton truck or a rebuilt passenger car.

The company has sent rebuilt trucks, as samples of what can be done, to all the Colonies and initial shipments have been sent to the United States to test out the market there. The lines which are going to America are those which are not well known over here or in the Colonies. The present premium on the dollar makes American business specially profitable at this time and it will be possible for the Slough company to undersell American makers and even used vehicle dealers in their own market.

Congressmen Getting Protests of Dealers

WASHINGTON, Jan. 31—Careful investigation here discloses that under the present law there is nothing which can be done to prevent the dumping on the American market of army trucks made in America and purchased in England by the Slough Trading Co. at a very low price. As a matter of fact, the British traders are not even compelled to pay import duty for the law provides that goods made in this country can be returned without any tariff charges.

The first shipment of these trucks to the United States was dumped on the
(Continued on page 246)

Baker Orders Army Truck Inquiry

Problem of Surplus to Be Determined

Anthony Presents Legislation to Dump Excess Vehicles—Reaves Urges Road Need

WASHINGTON, Jan. 31—Congressman Anthony's persistent efforts to dump 10,000 Army trucks on the market as surplus property and the introduction of measures requiring the transfer of this property to the Bureau of Roads for highway construction brought about a crisis in various branches of the Government to-day which resulted in a formal order from Secretary of War Baker directing the Inspector-General of the Army to conduct a thorough inquiry. There is some question as to the time required in the investigation but it is understood that the incoming Secretary of War will continue and possibly broaden the activities of the Inspector-General to a general inventory in order that the controversy may be definitely settled.

The Army appropriation bill which Congressman Anthony reported out to the House Saturday as chairman of the sub-committee on appropriations, carried legislation which "the committee has found necessary in order to carry out its policy of forcing an economic and efficient administration of the War Department, to freely resort to the use of limitations upon various funds, and in some instances in order to compel the sale of certain unnecessary supplies."

The chairman advised AUTOMOTIVE INDUSTRIES that this proviso was inserted to compel the War Department to declare 10,000 trucks as "surplus" and sell them. He stated that inquiry convinced him that the Bureau of Roads had sufficient trucks and motorized equipment and could not absorb the surplus material of the War Department.

Would Limit Motorized Units

The legislation which the Anthony committee introduced would limit the War Department in issuance of motorized equipment to National Guard organizations, contending that the infantry units should be developed and "minimize the organization of those branches of the guard which require the issue and maintenance of animals and motors and special technical equipment." The grand total of the Army bill providing for the support of the organization is \$331,222,612.12 or \$63,477,965.08 less than current appropriations and \$368,052,890.31 under the departmental estimates.

It is quite possible that this proposed legislation which the Kansas congress-

man intends to push through the House will be blocked on the ground that it is new legislation and not authorized by law. The attachment of these "riders" to appropriation measures is one of the principal causes of filibusters which delay essential money bills.

The fact that the passage of the Anthony measures would defeat the purposes of the Reavis bill introduced in the House last week indicates that a strong fight will be made to block the "rider." Congressman Reavis introduced a bill at the last session which would require the War Department to transfer surplus motor equipment to the Bureau of Roads but it met with a pocket veto. A similar measure was presented by him last week. National organizations of highway officials are in favor of the Reavis bill which would allow the various States to obtain trucks, tractors and other machinery at small cost. It would also prevent dumping this used equipment on the present overstocked market.

Both Reavis and Anthony claim that this equipment is rotting at camps here and abroad. The Inspector General must submit a report on three charges. He is also directed to inquire into allegations as to disposal of equipment through the sales department of the Surplus Property division.

R. C. Durant Joins New Durant Motors

NEW YORK, Feb. 1—R. C. (Cliff) Durant, son of W. C. Durant, will have charge of the distribution on the Pacific coast of the cars which will be manufactured by Durant Motors, Inc. He will also be in charge of an assembling plant which ultimately will be erected at Oakland.

As soon as his father announced the formation of the company which he will head, the younger Durant resigned as vice-president of the Chevrolet Motor Co. of California. With him will be C. M. Steves who has been Durant's assistant for several years in active charge of the Oakland Chevrolet assembling plant. Both men will give all their time to the new organization.

JEFFERSON PRODUCTION NEAR

JEFFERSON, WIS., Jan. 31—The Jefferson Rubber Co., which is erecting a new tire and rubber goods manufacturing plant at Jefferson, Wis., to be ready for production about Feb. 15, has made a return gift of \$15,000 in cash to the Jefferson Realty Co., which provided a bonus of \$25,000 four months ago to secure the industry for the city. The new factory is 80 x 300 feet in size and now fully enclosed, so that interior work is under way and some equipment is already being installed.

Limited Production Proposed by Ford

Not More Than 5,000 Men at Work—Few Cars to Be Made in February

DETROIT, Jan. 31—Approximately 5000 men returned to work to-day at the Highland Park plant of the Ford Motor Co. Virtually all of them are engaged in getting the plant ready for production, but the manufacture of cars has not been resumed and it is impossible to learn when it will be. The force will be increased gradually and when production is begun, it will be on the basis of actual sales and it will be some time before anything like a real working force is employed or quantity production started. It is safe to say that comparatively few cars will be made in February.

None of the parts makers who supply Ford have been given opening orders save the Briggs Mfg. Co. which makes coupe bodies. That company has recalled about 1000 men or 40% of its normal force on the strength of instructions from Ford, but it is said the order does not specify the number of bodies Ford will want or when his production will begin.

The parts manufacturers are under the impression that the probable production in the Ford factory for February will not be large enough to warrant them in reopening their plants. The Fisher Body Co. is taking on a few men each day on account of the gradual improvement in business.

The Liberty Starter Co., which makes all the Ford starters except those manufactured in the Ford factory, has not been ordered to resume operations. Officials of the company say they have no surplus and expect to receive instructions to start as soon as Ford production begins.

Formal Statements Withheld

It still is impossible to obtain any authoritative statement covering the Ford situation. Edsel Ford has not been discharged from the hospital where he recently was operated on for appendicitis and so many of the officials of the company have resigned, that those who are left are not taking any chances of unpleasant consequences by discussing the present situation. Nothing definite is known here of the progress of the negotiations for a large loan. It is understood that representatives of the Guaranty Trust Company, The Chase National Bank and the Liberty National Bank, all of New York, are participating in the financial parley. Bankers here are skeptical.

(Continued on page 243)

Many Bankers Attend Chicago Show Meet

Inspiring Addresses Feature Big Dealer Event—Urge Conservatism in Methods

CHICAGO, Feb. 1—Courage and clear headedness were held up as qualities necessary to carry on through the present business situation by speakers at a rousing trade rally with which the Chicago Automobile Trade Association, the National Automobile Chamber of Commerce and the Motor & Accessory Manufacturers Association opened the week's activities. Twelve hundred and twenty-five men, distributors, dealers and salesmen from Illinois and surrounding States, and manufacturers from all parts of the country, attended the dinner, which was alive with enthusiasm and which got everybody set for a week of hard work at the show.

Presided over by Leo A. Peil, president of the Chicago association, the program presented to the big crowd included George M. Graham, vice-president of the Pierce-Arrow Motor Car Co.; H. H. Merrick, president of the Great Lakes Trust Co., and A. R. Kroh, who has spoken at hundreds of farmers' and business men's meetings throughout the country. Significant in the attendance was the presence of a large number of Chicago and Central Western bankers, who rubbed elbows with the automobile men and heard Graham's address on the essential place of the automotive industry in the development of the country.

Graham cited history to prove the stability of the country and to show the soundness of investments in its future. He said that business had been running on too rich a mixture.

Graham defended the sales departments against critics of their methods during the period of easy selling, declaring that they never ceased fighting for business for their companies, no matter how easy orders came.

Merrick bespoke the faith of bankers in the automotive industry and urged upon it courage, conservatism and balance as sure builders of the road to success.

Kroh presented his picture of the benefits to accrue to industry and commerce from the improvement of farm conditions possible through diversification of crops and use of labor and time saving machinery.

Easier Credits Help Ohio Trade Recovery

TOLEDO, Jan. 31—The number of unemployed here is gradually growing smaller because of increased industrial activity in Toledo manufacturing plants. The improved situation and the stimulation given by the automobile show are helping sales of motor cars. Dealers are making some sales for immediate delivery

and more for April delivery in the city and though dealers in the outlying territory are taking only a few cars at a time, they are not standing still.

Credit and used cars remain the big obstacles to sales all through the territory, as elsewhere in Ohio. There is no more bank discrimination against the industry but financial houses simply haven't the money to loan on account of their investments in frozen industrial and agricultural inventories. Acceptance corporation rates are so high dealers and customers are protesting. However, the bank situation is better, with factories getting into production again and with farmers, on the eve of the planting season, letting go some of the crops that they were holding for higher prices.

United States Leads in Trailer Industry

WASHINGTON, Jan. 31—American consuls in all parts of the world have reported to the State Department on the possible market for motor truck trailers manufactured in the United States. These reports show that this country is far in advance of all other countries in the use of this economical aid to highway transportation, notwithstanding England was first to adopt the principle of trailer transportation and there are about a score of trailer manufacturers in Europe, located in England, France, Italy and Germany.

The United States, with about 75 trailer makers and probably 50,000 trailers in use, leads the world in this new industry. Trailers are being exported in limited numbers from this country to many parts of the world, including Canada, the West Indies, some South American countries, England, Scandinavia, West and South Africa, the Philippines and even China.

KALAMAZOO NAMES OFFICERS

KALAMAZOO, MICH., Jan. 31.—The Kalamazoo Motors Corp. at its annual meeting in this city re-elected H. A. Crawford president, and Joseph E. Brown of Kalamazoo to succeed William Johnson of Sioux Falls, S. D., as vice-president. R. M. Gregory and W. B. Milham continue respectively in the offices of secretary and treasurer. Two changes are reported in the board of directors, B. A. Bush and Glenn L. Shipman succeeding Frank H. Milham and A. L. Pratt.

ENGINEERS ESTABLISH PRIZE

NEW YORK, Jan. 31—The American Society of Civil Engineers has accepted the offer of the Engineering News-Record to establish an Arthur M. Wellington prize to be awarded annually for the best paper presented before the society on any phase on the science and art of transportation, whether by land, water or air. The prize is a memorial in honor of the former editor of Engineering News and consists of the income from a fund of \$2000.

Metropolitan Sales Doubled in January

Steady Upward Trend Experienced Following Show—Look for Normal Spring

NEW YORK, Jan. 31—January showed a slow, steady upward bending of the sales curve in the Metropolitan district. With motor car sales showing a gain over December of 50 to 100 per cent, territorial distributors are convinced that they have "turned the corner" and that there will be a gradual resumption of buying to a point probably within 50 per cent of last year's abnormal figure.

Nobody is making extravagant claims for spring. They realize that the January sales record contains the New York show impetus, and that the succeeding months will have to stand on their own legs, aided slightly, perhaps by the closing of show prospects.

New York's greatest encouragement is the optimistic reports from the smaller dealers of the territory. Wholesale orders were particularly good following the show and the weekly reports of sales indicate a decided weakening in the buying apathy in the territory. Aggressive selling of the past two months is having its effect.

Truck distributors feel somewhat encouraged, but have experienced very little increased trade. The truck business is described as "spotty" which is taken to indicate that it is reacting to the resumption of business in various industrial lines.

With the settling of the weather and the beginning of building operations, which are expected to open on a fairly large scale, a decided increase in the sale of trucks is expected.

The weather and the resumption of spring business is also a factor in the consideration of spring business by the passenger car dealers. It is felt now pretty generally that the breaking of the mild winter to date by a heavy storm or two may postpone the actual opening of spring buying a week or two, but it is too late in the season to have any effect for a longer period.

WILSON LISTS NEW OFFICERS

PONTIAC, MICH., Jan. 29—There have been several changes among the officers of the Wilson Foundry & Machine Co. for which reason a list of officers and directors to date has just been issued. The officers are: President, Charles B. Wilson; vice-president and general manager, D. R. Wilson; secretary, W. E. MacKenzie; treasurer, C. E. Killinger; assistant treasurer, Dave J. Moreland. Directors: Walter C. Chrysler, F. K. Dolbeer, C. B. Wilson, G. R. Spencer, D. R. Wilson, C. E. Killinger and J. E. Kipperley. Officials express confidence as to the future and believe that before the end of February the big plant will again be in big production.

Chain Company Sues to Protect Patent

**Infringement of Weed Rights
Alleged in Suit Against Phila-
delphia Companies**

WILMINGTON, DEL., Feb. 1—Suit has been started in the United States District Court here by the American Chain Co., Inc., against the United Auto Stores, Inc., of Delaware, and against George J. Campbell for infringement of the Weed chain patent No. 768,495, granted Aug. 23, 1904. Both defendants have their principal places of business in Philadelphia. A motion for preliminary injunction has been set for hearing before Judge Morris on Feb. 14.

It is alleged in the complaint that a chain of the so-called reversible ladder type was manufactured by Campbell so that it closely resembled in construction and general appearance the genuine Weed grip, but containing inferior quality material and workmanship. These chains were sold by the United Auto Stores. Except for the acts of the defendants, it is declared there has been general acquiescence on the part of the public in the rights of the American Chain Co. under the Weed patent.

It is further alleged that the defendants are engaged in unfair competition in that the chain grips made by Campbell and sold by the United Auto Stores are provided with cross-chains having a light coating of copper plating which contrasts with the gray coating of the side chains, giving these chains an appearance decidedly similar to the distinctive dress that has long been given to the Weed grip by the American Chain Co.

Parsons Patent Expired

NEW YORK, Feb. 1—Life of the patent granted Harry Parsons, known technically as No. 723,299, under which the Weed tire chains had been made for seventeen years, expired March 24, 1920. This was controlled by the American Chain Co., which succeeded the Weed Tire Chain Co., and purchased the Weed holdings. The company also owns the Weed patent No. 768,495. The Parsons patent covered a chain put on zig-zag fashion, and the Weed a chain which goes straight across the tire.

GRAND RAPIDS PLANTS RESUME

GRAND RAPIDS, MICH., Jan. 31—The The Hayes-Ionia plant has taken back 500 men and will be back to normal Feb. 15. Three hundred employees will return to the Macey company's plant Monday.

CORRECTION

An error was made in the issue of AUTOMOTIVE INDUSTRIES of Jan. 20 in its account of the decision of the United States Supreme Court sustaining the right of revenue officers to seize any automobile containing contraband liquor

regardless of whether the owner had knowledge of the illicit use to which the vehicle was being put. The article stated that the particular car in question was loaned to a friend. This was an error because the car had been sold to J. W. Goldsmith by the Grant company although only \$800 had been paid on it and the Grant company retained title as the actual owner. The Grant company had no knowledge whatever of the transportation of liquor in the car but the vehicle was ordered forfeited.

Diamond T Restrains Cut-price Advertising

ST. LOUIS, Jan. 31—A perpetual injunction has been granted in Federal court by Judge Faris to the Diamond T Motor Car Co. of Chicago, restraining Harry Newman, Inc., of this city, from advertising or offering for sale Diamond T trucks at less than their listed price. In the petition for an injunction, it was alleged that the defendants were former distributors of the truck in St. Louis but that their contract was cancelled for good reason and that they were advertising in twenty-five of the larger cities of the country that they would sell Diamond T trucks at a 35 per cent discount without any intention of making bonafide sales, but with the malicious purpose of injuring the motor car company and for the further purpose of forcing the settlement of a law suit then pending.

Judge Faris appointed a special master to establish damages and in granting the injunction, declared he never had seen a case "that equals the malice involved in this."

BADGER INCREASES CAPACITY

MILWAUKEE, Jan. 31—The Badger Mfg. Corp. of Milwaukee, maker of bumpers, tire carriers, racks, creepers, cut-outs, steering wheels, etc., has moved into quarters where 45,000 sq. ft. are available, as against 26,000 sq. ft. in the former plant at 313-315 Milwaukee Street. The new factory is one erected several years and until now occupied by the Harley-Davidson Motor Co. as its automatic screw machine shop. The Badger Corp. was formed in 1917 as the outgrowth of the Auto Parts Mfg. Co., organized in 1914. It is capitalized at \$300,000 and is increasing its force from 150 to 200 men. The business of 1920 aggregated nearly \$1,000,000, against \$601,000 in 1919. Charles H. Hathaway is president; John T. Johnston, vice-president, and Walter V. Isgrig, secretary and treasurer.

OILGEAR TO MAKE PARTS

MILWAUKEE, Jan. 31—A charter has been granted to the Oilgear Co., incorporated under the laws of Wisconsin with \$500,000 capital stock, to engage in the manufacture of hydraulic transmissions and devices for the automotive and general industries. The promoters are represented by J. A. Dietrich, Howard T. Foulkes and J. A. Wickham, of the law firm of Quarles, Spence & Quarles.

Interlocking Tire Officials Resign

**Complete Re-organization of the
Company Is Planned by Stock-
holders and Creditors**

AKRON, Jan. 31—Creditors and stockholders of the Interlocking Cord Tire Co. of Akron and Mogadore will completely reorganize the company and name new officers to replace present directors and four of the main officers who are under criminal indictment for alleged violation of the Ohio "blue sky" law. Announcement to this effect was made following the formal offer of Walter Kline, president; C. E. Foust, secretary; J. W. Rinear, treasurer, and L. W. Rinear, sales manager, to resign as officers of the company in order to permit lifting of the temporary receivership under which the corporation now is operating. Kline and his co-officers made the offer of resignation before Judge Willard Wright in Common Pleas Court to-day.

Kline is indicted for alleged violation of the "blue sky" law and on a charge of obtaining money under false pretenses. Foust and the two Rinears are indicted under the "blue sky" law for alleged assistance in flotation of the corporation's securities without a State license.

Following the offer of resignation, thirty-six creditors of the company, whose claims constitute approximately \$75,000, met and agreed tentatively to accept the offer and to proceed at once with the reorganization of the company. F. B. Hood, Arthur Sweeny, Frank Lea and W. B. Smith, who were recently elected to the directorate of the Interlocking Cord Tire Co., but who have not as yet qualified for such official capacity, have also offered to resign, it was announced.

Creditors named a committee consisting of W. H. Flower, chairman, F. J. Bents, L. E. Newman, Otis Prier, R. B. Koontz and P. E. Welton to confer with stockholders on the matter of reorganization. A meeting of stockholders will be called, it was announced, to consider the proposal and ratify the plans and also to select representatives on the new board of directors.

Officers Deny Allegations

Indicted officers of the company have issued sweeping denials of all charges contained in the receivership and the criminal indictments. In a formal statement they charge the receivership and grand jury actions to be the result of an alleged attempt upon the part of a few stockholders to form a conspiracy to "ruin the company," and that the indictments were sought "simply to scare more stockholders into the opposition camp," it being stated by the officials that stockholders originally petitioning for the receivership never at any time represented more than 10 per cent of all shareholders.

Burleson Defends Junker Plane Use

General Efficiency and Economy
Factor in Purchase—Ameri-
can Craft Little Used

WASHINGTON, Jan. 29—Responding to a House resolution demanding information relating to purchases of Junker aircraft, Postmaster-General Burleson to-day advised the Congress that Junker planes have demonstrated their efficiency and economy in actual demonstrations.

The Postmaster-General said:

"The Junker airplanes purchased by the Post Office Department represent a forward step in airplane development over the development at that time in this country. Their operation over 30,122 miles gives 5.1 miles per gallon of fuel, as against an average of about 2.5 miles per gallon with the planes and motors in the air mail service. The cost of flying operations with these planes is about 30 per cent less and the cost of maintenance and upkeep about 50 per cent less than is the flying cost and maintenance cost of the Liberty motored De Haviland planes turned over to the Post Office Department by the Army and Navy.

"On the other hand, the cruising radius of the Junker plane is at least 50 per cent more and the possible mail load is nearly two and one-half times as great as that of the surplus war planes with which the air mail is principally operated. Whether the relatively low cost of maintenance of a Junker plane over a De Haviland will continue as the planes see more service is something that is being determined by the daily operation of these planes by the side of the De Havilands.

"When the German planes were put into service by the Post Office Department, after planes of this type had made a number of remarkable long-distance runs for other parties, defects in the fuel installation and in the engine compartment, ventilation and drainage were discovered through planes catching fire in the air.

Construction Defects Corrected

"These defects of construction and engineering were promptly remedied by the Post Office Department, since which time the planes have been operating steadily in the mail service without fire hazard or casualty of any character to the crews operating them. The safeguarding against fire hazard, as the result of the accidents to the Junker planes, has been of great importance to aviation and has resulted in the elimination of fire hazard in other mail ships."

Actually, the Post Office Department bought eight Junker planes, for spare parts to the value of two additional planes were obtained to keep the other six machines operating. The purchases were made direct from the J. L. Aircraft Corp. at a cost of \$200,000. It was

GERMAN PARTS MAKERS UNDERSELL AMERICAN

SPRINGFIELD, MASS., Feb. 1—German competition in the sale of automobile parts has already been felt by American manufacturers. Investigation by the American Bosch Magneto Co. discloses that German manufacturers are offering South American consumers Bosch magnetos and parts at prices with which the American company cannot compete.

announced that 215 planes of American make are in possession of the Post Office Department at this time, of which 65 are now in use. The remainder are either in warehouses or being remodeled.

Army Air Appropriation Reduced to \$19,200,000

WASHINGTON, Jan. 31—The House Committee on Appropriations has disregarded the appeal of Brigadier General Mitchell, assistant chief of the Army Air Service and has recommended the appropriation of only \$19,200,000 instead of the \$60,000,000 asked, for the development of aviation as a means of military defense.

In his appeal for funds, General Mitchell insisted that the airplane had become superior to the battleship and that a well-balanced military program must include a military aerial force to be effective in the next war. He stated that a sufficiently large force could be formed and equipped in three years at a cost of \$45,000,000 which represented no more than the cost of a battle cruiser. He contended that the armored ship is just as helpless as the armored knight was when firearms were brought against him.

PEUGEOT OUT OF 1921 RACING

PARIS, Jan. 21—(*Special Correspondence*)—Peugeot will not take part in any automobile races this season, according to a decision of the Board of Directors of this important French company. This decision comes as a surprise, for not only has Peugeot been a very strong supporter of racing in the past, but it has a set of 183 cu. in. racing machines all ready. This policy removes a possible competitor from the Automobile Club of France Grand Prix for next July, and makes it very unlikely that any Peugeot cars will be sent for the Indianapolis race. General business depression is said to be the reason for Peugeot's withdrawal from racing.

DAIMLER DOUBLES CAPITAL

NEW YORK, Feb. 2—A dispatch from Germany states that the Daimler Motor Company of Stuttgart, which manufactures the Mercedes car has increased its capital stock from 100,000,000 shares to 200,000,000 shares.

Landing Place Lack Halts Air Progress

Development Dependent Upon
National Action in Providing
Facilities, Says Professor

BOSTON, Jan. 28—Boston has an opportunity of gaining fame as an aviation center. Prof. E. P. Warner of the aeronautics department of Massachusetts Institute of Technology, yesterday told how this city, this State or this country might advance the use of airplanes, and the secret is for the municipality, the State or the country to provide landing places for the ships of the air.

"We are making progress in perfecting the airplane—making it more serviceable and less dangerous—but the whole program of aviation has practically come to a standstill as far as the public making use of it," declared Professor Warner.

"An aerial taxi-cab in London costs approximately the same as an earthbound taxi in Boston. The charge in England for an aerial taxi is 2s 6d, or 44 cents for two persons per mile. This fare is only two and a half times as large as that for an earthbound taxi and it costs approximately the same amount to travel by airplane in England as by taxi-cab in Boston.

"We can do as well with our American planes and costs if the proper support is given to us by the public and the government. The government ought to encourage private enterprise in aviation, for commercial purposes and as sport.

"But private capital is slow to take up aviation probably because of the high cost of landing places. The nearest landing places to Boston are at Lynnfield and Framingham. In Texas and California the towns are granting lots for landing places and those States should go ahead fast in aviation.

"It would be somewhat more difficult for a city or State in New England to buy landing places because property is more expensive and it is harder to develop aviation here and because there are so many trees and so few landing places in case of emergency.

Potential Business Here

"However, the potential business is here. Airplane service between Boston and New York could be established to make the trip in less than three hours. But very little time would be saved by airplane if a person had to land in Framingham at this end and Long Island in New York."

Professor Warner said the actual costs of air travel in Europe have shown a tendency to steady reduction. He asserted that the fare charge on the London-Paris route was originally 20 guineas, but has since been decreased several times, and now stands at 10 guineas (\$37) for the one way journey and 18 guineas for the round trip.

Russian Trade Ban Not Insuperable

Border Countries Present Way to
Meet Obstacles—Payments
Chief Difficulty

WASHINGTON, Jan. 31—Although the export of automotive products to Russia still is technically under the ban of the State Department on the ground that most of these products might be used for military purposes, there are no insuperable obstacles in the way of American trade with the Soviets. This is admitted unofficially at the State and Commerce departments. Whatever trade is done, however, must be through Scandinavia, Poland or some other country bordering on Russia. Direct shipments could not be passed through the custom house, but no obstacles would be placed in the way of shipments to some consignee in one of the bordering states.

As a matter of fact, the chief difficulty confronting an American automotive manufacturer who seeks an outlet for his goods in Russia is making satisfactory arrangements to get payment for the goods. If this can be done, the hardest part of the problem has been solved.

Trading with Russia is very largely a question of ethics. Manufacturers in other countries are doing it and making no bones about it. It is significant of the high sense of honor of American automotive manufacturers that no applications have been made to the State Department for permission to ship to Russia since the ruling in reference to their products was made by the State Department. Even more significant is the fact that neither the State nor the commerce departments has received any report of surreptitious trading.

Russia offers a large potential market for small tractors and the State Department undoubtedly would permit their export. It would be difficult to make a military weapon out of such a machine. It is no secret that a considerable number of Fordsons have been absorbed by Russia.

No Espionage Maintained

The State Department does not maintain an espionage system in the countries bordering Russia to determine whether its regulations in regard to trade with the Muscovites are being violated. It has no funds to pay secret agents and apparently no disposition to interfere. It is stated frankly that there is nothing to prevent the export of cars and trucks from this country into Russia through Denmark or Poland if the shipper has an agent to get the goods across the line and if he is enough of a financier to work out some satisfactory method of payment.

The Danish committee for the resumption of trade with Russia has established at Copenhagen the International Clearing House with a capital of 2,000,-

000 crowns to foster trade with the Soviets. The All Russian Central Union of Consumers Societies has deposited 2,000,000 rubles in gold in the Danish National Bank as security for the exchange of goods and credits. This is designed as a revolving fund and it is expected that much of the trade will be on a barter basis.

The Soviets are stated to contemplate increasing this fund to 25,000,000 rubles in gold and it is known that they have established other credits for trading purposes in neighboring countries although most of their commerce at present is going through Copenhagen.

Ford British Output Totals 40,500 in 1920

LONDON, Jan. 14 (*Special Correspondence*)—Ford's Manchester works produced 40,500 vehicles last year and employed about 4000 hands. This output is stated to be 20,000 better than ever before.

Moreover, the result has been financially good, ordinary workers at 60 cents the hour getting \$35 bonus and higher paid workers, if engaged not later than 1915, \$195 bonus. The rest of the staff eligible for a bonus share also will benefit. Further, 50 per cent or half the workers, by virtue of being investors in Ford stock, on which they get 6 per cent interest per \$50, will receive an extra 6 per cent.

Saskatchewan Outlines \$24,000,000 Road System

SASKATOON, Sask., Jan. 31—Plans for the construction of 1607 miles of paved highways throughout Saskatchewan have been evolved by C. J. Yorath, city commissioner of Saskatoon, and will be laid before the provincial government for consideration. The program of road building, it is estimated, would cost \$24,000,000. It provides for a pavement fifteen feet wide on all highways and the gradual recovery of the money expended by a system of toll-gates such as are still in use on turnpikes in certain American States. California's paved automobile highways are suggested as the model.

URUGUAY PLANS HIGHER TARIFF

NEW YORK, Jan. 31—Increased tariffs to protect the local body building industry is proposed for Uruguay, according to a report from Vice Consul Avery at Montevideo. The Minister of Finance, the Consul states, had sent to the Administrative Consul the following proposals for increases: Automobiles of bonded value not exceeding \$700 shall pay an import duty of 10 per cent; those above that value shall pay 20 per cent on the value of the chassis, and 25 per cent on the value of the body. All automobiles shall pay "additional duties" which amount to about 14 per cent. Trucks shall pay 5 per cent of their value but are exempt from paying the additional duties.

Fuel Shortage Hurts South African Trade

Government Aid in Meeting
Problem Sought—American
Cars Gain Popularity

JOHANNESBURG, SOUTH AFRICA, Jan. 3—(*Special Correspondence*)—The petrol question is still exercising the minds of those connected with the motor trade. Supplies have been more generous during the past month but the situation still leaves a great deal to be desired. It seems that while other sections of the commercial community have received consideration from the Government the motor trade has been singularly neglected in this respect. With all due regard to this the motor trade continues to be one of the most flourishing branches of the community.

Houses have in some cases gone as far as to import stocks of fuel entirely independent of the oil companies and the trade generally seeks either a decontrol with a free market or that the control take the form of a percentage on the landed cost. Letters to the daily press have been suggesting the importation of petrol in bulk instead of the method that at present prevails. Facilities for this measure exist at several ports of the Union and this certainly seems a feasible way out of the difficulty. The question of shipping has however to be considered in this connection but in view of the fact that the shipping position here is gradually getting easier this ought not to be an insurmountable difficulty.

Sales of cars have shown a rise over the figures for last month and dealers are optimistic about the car position. The action taken by certain banking institutions from the countries of export in regard to bills drawn and presented by shippers will tend to make the number of cars now coming to South Africa less and less until the usual facilities are resumed. The decreased prices of cars at the factory caused a stir for a short while, but has not made any difference in sales, and the demand for automobiles continues as strong as ever.

Light Weight Car Popular

The Spacke has arrived and bids fair to become a favorite if the inquiries for a car of this class can be quoted as authentic. The English small models that are imported are too high priced to place them within the reach of many, and the Spacke fills a long felt want in the small car class. Dealers have taken trips to Cape Town in order to fix up rights for various parts of the country.

South Africa is gradually marketing accessories of home invention and manufacture. The latest is a special stand for motorcycles. Very favorable comment has been made by those who have witnessed the ease of control of this stand and quantities are in the process of manufacture in order to cope with the demand that has arisen in motor-cycling circles.

Fourth Reserve Bank Finds Trade Better

Lower Prices and Easier Credits
Help Inaugurate Buying in
Cleveland District

CLEVELAND, Jan. 29—The great army of automobile owners who trade in used-cars in purchasing new cars are coming into the market to boom sales, according to the business forecast of the Federal Reserve Bank of the Fourth District. This is a source that is going to send the automobile business soaring ahead of the volume of trade in the average line of business according to reports received at the bank.

These used car owners have for some time been watching readjustment developments that send down the value of their used cars. Now they are getting to the point where they want to buy before the general readjustment process further reduces their second hand valuation. The bank says that there are fewer buyers of low priced cars in the market.

Motor truck manufacturers report increased buying in practically all sections of the country; public utilities are placing orders, and according to one large producer "there is every indication of considerable business from large industries." Makers of passenger cars comment on the fact that sales at the New York show, while not as large as a year ago when the shortage was so great, were quite in keeping with the records of all previous years.

Speaking of general conditions in the Fourth Federal Reserve District, the bank says that the turn of the year has witnessed a decided change in business sentiment. Reports this month are almost a unit in declaring that signs point to improvement in the business situation. Easier credit conditions are reported. Lower prices for commodities mean lowered costs of doing business with a consequent release of additional credit. This may not become apparent until many large inventories purchased at top prices have been worked off, but it is a condition that will ultimately develop as a result of the resumption of business.

Tractor Demand Shows Steady Gain in Year

CLEVELAND, Jan. 29—That the tractor has been slower to come into widespread popularity than the truck or passenger car is not due to lack of merit or lack of desire on the part of the farmer, says L. W. Ellis, of this city, who has taken a leading part in advertising the tractor. Putting the tractor on the farm means the substitution of individual power for motor power, a complete new plan of operation for the farmer, and the scrapping of old plans. The farmer has been slower to work out the solution than they have in other lines, and the tractor is not so old as the truck and passenger car.

But it is working out in Ohio. Ohio farmers, for instance, had 8313 tractors in use last year as compared to 4279 in 1919, a gain of nearly 100 per cent in two years. Figures for the United States show that nearly 200,000 tractors were made and sold in 1920, as compared to the 300,000 that were in use up to the end of 1919.

R. T. Hodgkins, sales manager for the Cleveland Tractor Co., says that prospects for 1921 are even better than they were for 1920. He says that his company has sold many more tractors in December 1920 than they did in the corresponding month a year ago, and that dealers have small stocks on hand.

Bower Bearing Yields \$90,000 Profit in Year

DETROIT, Jan. 28—The annual statement of the Bower Roller Bearing Co. shows that during the fiscal year ended Dec. 31 the company made a net profit of approximately \$90,000. The report of the company states that at the end of the first six months last year profits totaled \$122,400 but that during the other half of the year the company lost \$34,993. The sales for the first half of 1920 totaled \$769,755 and for the second half of the year they were \$320,395, or a total of \$1,090,140. During 1919 the business totaled \$1,603,205.

The Bower company paid its stockholders \$90,000 in dividends during the first six months of 1920, or about \$3000 more than the total net profits made during the year.

The company has kept its personnel of skilled workers during the period of depression and is in a position to go ahead increasing its production at any time. The plant has been given a thorough overhauling and is in better shape to take care of business than ever before. Officials declare that they are confident as to the gradual return of activities in the automobile industry.

TOPP-STEWART ADDS DIRECTORS

CLINTONVILLE, WIS., Jan. 31—The Topp-Stewart Tractor Co. of Clintonville, Wis., at its annual meeting, increased the number of its directors from seven to nine, the new members being H. A. Rindt and Theodore Meyer. Officers were re-elected as follows: President, Dr. W. H. Finney; vice-president, H. F. Zarling; secretary, A. C. Cather; treasurer, Levi C. Larson. Active production will be resumed about Feb. 1 at a materially increased scale, which is required mainly by a wholesome enlargement of foreign demand. Domestic orders also are accumulating at a satisfactory rate.

CREDITORS SUE PERFECTION

MILWAUKEE, Jan. 31—The Perfection Engine Co. has been made defendant in involuntary bankruptcy proceedings by the following creditors: North Milwaukee Foundry Co., with a claim of \$2,939; Badger-Packard Machinery Co., \$125; Detroit Auto Radiator Co., \$720.

Diversity of Crops Urged to Help South

Georgia and Alabama Dealers'
Associations Foster Movement
to Increase Prosperity

ATLANTA, Jan. 31—A movement to encourage a program of diversification of crops on Georgia farms through a campaign that is to be inaugurated and carried on systematically through every county of the state, is to be fostered by the Georgia Automotive Dealers' Association, according to a decision reached at the annual convention held here.

The impetus to the movement was given by A. R. Kroh in an address before the second annual convention of the association. Kroh, who is himself a practical farmer, pointed out that since 1900 more than 10,000,000 farmers have left the rural districts for the cities and as a consequence the cost of living is mounting higher and higher because America consumes more than it produces.

Kroh went thoroughly into the subject of power farming, discussing this phase of the industry from the dealer's standpoint and showing how diversification of crops on Georgia farms would mean an enormous increase in the demand for power farming equipment, principally tractors.

While the movement to bring about a diversified program will be fostered by the automobile association, bankers, merchants and industrial leaders throughout the state will be asked to assist in the work. Plans are being formulated by association officers to arrange a general meeting for the near future and invitations will be extended to business men to attend. It is believed this meeting will probably be held during the week of the automobile show, March 5 to 12. The principal address will be delivered by Kroh, who will explain the whole program of diversification exactly as it is to be encouraged by the automobile association.

A similar movement is already under way in Alabama, fostered by the Alabama Automobile Dealers' Association. An address was delivered by Kroh at the sixth annual convention of the Alabama dealers held at Albany, Ala., Jan. 24. The following day a conference of bankers, business men and merchants was held at Birmingham, where the movement was endorsed and it was decided to carry it out during the coming year under the auspices of the automobile association.

I. M. C. TO REDUCE WAGES

NEW BRUNSWICK, N. J., Jan. 31—The branch factory of the International Motor Co. here posted a notice yesterday of reduction in wages ranging from 10 to 30 per cent, effective immediately. The working force will also be reduced. The wages of a number of the office force in the toolmakers' division will be cut from 85 to 65 cents an hour, and those of laborers from 55 to 35 cents.

W. R. Campbell to Be New Ford Executive

Nomination As Klingensmith
Successor Considered Certain
—Jewish Attacks Hurt

DETROIT, Feb. 1—While official announcement is lacking, it is stated on authority that W. R. Campbell, secretary and assistant general manager of the Ford Motor Co. of Canada, will succeed F. L. Klingensmith as vice-president and general manager of the Ford Motor Co. Campbell is now at the Highland Park plant and has been there for several days. He is virtually in authority at the big factory.

Klingensmith held the position of treasurer, but it is understood the duties of that office will be given to some one other than Campbell, who will devote his entire attention to active management of the plant, chiefly along production lines. It is reported that important financial matters in future will be handled entirely by Henry Ford, whereas Klingensmith heretofore negotiated practically all the financial deals.

Campbell is thirty-nine years old. He has been with the Ford company of Canada since it was organized in 1904. Prior to that he was with the Queen City Oil Co. His home is at Walkerville, Ont., where the Canadian plant is located. He is said to be of exceptional ability and Henry Ford is said to have had his eyes upon him for a long time.

The Ford organization still is in more or less of a state of chaos. W. C. Anderson, director of operations in Europe with headquarters in London and Paris, tendered his resignation last week and this was followed by that of Louis Block, in charge of the Philadelphia branch.

Resignations Not Explained

In the absence of statements from officials as to the reason for these resignations and the reluctance of both Anderson and Block to discuss them, semi-official statements are to the effect that the anti-Jewish campaign of Henry Ford's newspaper, the *Dearborn Independent*, is responsible. From a man close to Anderson it was learned the foreign chief had been driven to the point of severing relations with the company by reason of a virtual boycott on Ford products in foreign countries as a result of the attack on the Jews. This man said not only were the majority of foreign dealers of Jewish descent, but that the money in Europe was in the control of Jewish bankers. Likewise, probably a majority of the prospective customers for Ford products were of Jewish origin or closely connected with that race.

Business in the foreign countries, it is said, began to slump several months ago at the outset of the campaign and grew worse rapidly until the point was reached where it became apparent the attitude toward the Ford Jewish fight

had practically ruined the business of the company on the continent.

Anderson, who is regarded as one of the most competent men in the foreign field, is said to have made repeated entreaties, appeals and finally demands that the Jewish attack cease, but all of his efforts are said to have been unavailing and instead the attacks became even more bitter. The recent resignation of Vice-President Klingensmith, which was in great measure due to the same cause, convinced Anderson, according to his friend, that there was no alternative and he promptly decided to come to America and tender his resignation.

Anderson Record Envious

Anderson is widely known among automobile men in America and Europe as "Fuzzy" Anderson. He was one of the many bicycle racers who entered the automobile business at its inception. He joined the Ford company as branch manager sixteen years ago and later was put in charge of the Chicago business after several years in St. Louis. Two years ago he was selected, after a survey of the entire Ford organization, as the man best qualified to take charge of the Ford European business. He was sent abroad with full control of production and sales during the reconstruction period, and established a record that automobile men and Ford officials admit was remarkable.

Anderson has been in Detroit several days, and will be here until sometime this week. While he has no plans to announce for the future, he has been in constant association with leading manufacturers, and his friends say it is not unlikely when he leaves Detroit he will go as the foreign representative of one of the newest cars on the market.

No information could be secured regarding the resignation of Block other than statements of friends that he was prompted by the same reasons that forced the resignation of Anderson.

Ford Sued by Gest for Alleged Libel

CHICAGO, Feb. 1—Morris Gest, theatrical producer, has filed a \$5,000,000 damage suit against Henry Ford in the Circuit Court of Cook County, alleging libel in statements published on Jan. 22 in the *Dearborn Independent*, Ford's paper, which has been running a series of attacks on the Jews. Gest takes exception to various statements made, but is particularly incensed at the intimation that he has neglected his parents who still live in Odessa. His counsel asserts that his parents are very wealthy and do not need their son's assistance.

PIERCE PROFITS \$1,769,914

NEW YORK, Feb. 3—The report of the Pierce-Arrow Motor Car Co. for 1920 shows net profits after charges and Federal taxes of \$1,769,914, compared with \$2,491,070 the previous year.

Limited Production Proposed by Ford

Not More Than 5,000 Men at
Work—Few Cars to Be Made
in February

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tical as to the success of the conference.

It is intimated that the resumption of operations at this time may have been due in some measure to the psychological effect it might have on the financial world.

The foremen were the first to arrive at the Ford plant to-day and the next employees to go to work included the best element among the married men with dependents. They were put to work cleaning up the plant and getting the machinery into shape. Manufacture of parts will be resumed before production of cars is begun as the surplus of cars on hand when the plant closed has been exhausted.

W. A. Ryan, general sales manager for the Ford Co. asserts that sales have increased rapidly in the last 10 days in most sections of the country. Cars have been moving from districts where agricultural or industrial conditions caused a backward market and sent to territories where dealers were moving them rapidly.

Newspaper reports of renewed industrial activity in Detroit have been very much exaggerated and have been the result of an attempt to make the outside world believe Detroit was coming back rapidly as a great manufacturing center. Most of the dispatches which have appeared in other cities have been a rehash of stories in local papers which seek to minimize the unemployment situation.

It is true that there is a gradual improvement in the industrial outlook here, but it is coming about slowly and only a few men are taken on at any of the factories. Conditions do not differ in any material way from those which prevailed after the resumption of work following the Christmas holidays. There is some production in most of the automobile factories but it is on a greatly reduced scale and it will be increased only as actual orders warrant.

Negotiations Reported Off

NEW YORK, Feb. 2—While financial papers still are printing numerous stories recounting the alleged financial difficulties of Henry Ford, it is impossible to obtain anything tangible here on the progress of negotiations between Ford and New York banks. There is substantial reason to believe that these parleys have been broken off.

Reports from Detroit are to the effect that Ford has ceased his efforts to obtain financial aid in this city because he considered the bankers' demands unreasonable. It also is understood he flatly refused to permit a bankers' committee or a representative of the banks to supervise the operation of his plants. No statement has come from Ford.

Unsold Cars Load British Markets

Thousands of American Vehicles
in Heavy Surplus—Trade
Fails to Revive

LONDON, Jan. 21—(*Special Correspondence*)—The turn of the year brought no improvement in the automotive trade in England and conditions generally are no better than they were the last three months of 1920. The slight but definite improvement which was expected after Jan. 1 has failed to make itself evident. The trouble seems to be that no one expected the cessation of buying was going to be so definite and dealers therefore took large stocks of cars while the manufacturers, supposing these cars soon would be sold to the public, continued to manufacture at full speed. The result is that there is in the country to-day a stock of vehicles sufficient to last from six to eight months even if the demand rises to the normal level.

It is reported that Ford, who produced at Manchester in 1920 just 40,000 cars, or nearly twice the best record for any previous year, has between 7000 and 8000 cars in the hands of dealers. Willys-Overland has 2600 cars in stock at Manchester. Its December deliveries numbered only 34. Chandler is reported to have 300 cars unsold; Cole 100 and Jordan 40. The great race course at Aintree, which was operated as a shell factory during the war, is said to be piled high with American motor vehicles such as All-American trucks, Traffic trucks, Dixie Flyers, and Moon cars. The stock of Hudsons and Essex on hand is estimated at from 300 to 400.

English makers are no better off than their American competitors. The Angus-Sanderson company, which started out a year ago with a popular 15 h.p. car has gone into liquidation, as has the Bean company. This takes out of the field two of the three quantity production post war jobs. The Cubitt, the third of this group, still is in operation although its makers had no previous experience along mechanical or engineering lines until after the war. It is interesting to note that before the Bean plant was practically closed two months ago it had reached a production basis of 100 a day which is astounding from a British point of view. Credit for this record is given to Production Manager Conroy, who came here from the Willys-Overland plant at Toledo.

Austin Makes Headway

One English maker who is making a little headway is Austin. He has kept his prices down to a reasonable level and stood the losses which he made all last year, believing that in the end a volume of business would be maintained which would bring financial reward. His output is relatively small, however, probably not exceeding 40 or 50 a week.

Brown Succeeds Dunbar as Clydesdale President

CLYDE, OHIO, Feb. 1—Frank D. Brown, a director and chairman of the finance committee of the Provident Bank & Trust Co. of Cincinnati, has been elected president of the Clydesdale Motor Truck Co., succeeding C. R. Dunbar. Brown is now in Florida but is expected to take an active part in the management of the company of which he has been a director. Other officers elected by the company, are: Vice-presidents, C. R. Dunbar, and A. C. Burch; treasurer, W. P. Dodge; assistant treasurer, J. C. L. Krebs, who has been a vice-president; secretary, Homer Metzgar. The board of directors is composed of the officers and J. H. Baynes and Charles H. Bowker of Northampton, Mass.

Gasoline Prices Drop Over Wide Territory

NEW YORK, Feb. 3.—Announcement of reduction in prices of gasoline and crude oil in virtually all the eastern and midwestern territory have been made this week by the various oil companies. This follows other cuts made in the past few weeks. The first reduction thus far made in the New York and New England territory was announced by the Standard Oil Co. of New York, which marked down motor gasoline 1 cent a gallon. The Standard Oil Co. of New Jersey also announced a cut of 1 cent, the second in the past two months.

The Sinclair Refining Co. has reduced gasoline 2 cents a gallon in Cleveland and has made a second cut in a month in Chicago, where the price at filling stations is 25 cents and for tank wagon delivery 23 cents. The same price has been made by the Standard Oil Co. of Indiana for the entire midwest territory.

Crude oil has been reduced to \$2.50 a barrel by the Magnolia Petroleum Co. and the Prairie Oil and Gas Co.

Gasoline Reserves Increase

WASHINGTON, Jan. 29—Gasoline reserves are gradually increasing, according to refinery statistics compiled by the Bureau of Mines for November, 1920, which shows an increase of 50 per cent in the daily average output as compared with 1918. Production of gasoline for November increased by 62,000 gal. daily over the October output. Total stocks at refineries Nov. 30 amounted to 354,835,764 gal. as compared with 378,133,185 gal. for the same month last year and 270,072,011 gal. in November, 1918.

Petroleum Stocks Increase

WASHINGTON, Jan. 31—Oil production in the United States in 1920 totaled 443,402,000 bbl., while consumption reached the unprecedented total of 531,136,000 bbl. Despite the excess of consumption over production, the end of the year showed a net increase in petroleum stocks of more than 10,000,000 bbl.

Goodyear to Receive \$45,000,000 New Funds

Announcement of Refinancing
Details Awaits Adjustment of
Merchandise Claims

NEW YORK, Feb. 2—The adjourned meeting of Goodyear Tire & Rubber Co. stockholders, set for yesterday has been again adjourned until Feb. 11 due to delay in satisfactory consummation of refinancing negotiations. Officials of the company state that they hope to announce the full refinancing plans on Feb. 11, and report that satisfactory progress is being made in the negotiations.

It is stated on authority that the negotiations for a permanent loan have been practically concluded and that the only matters now remaining to be adjusted, are with the company's large number of merchandise creditors. Under the refinancing plan the company is to receive approximately \$45,000,000 in new money, it is stated. This will permit immediate retirement of the notes for \$28,800,000 negotiated by the Goldman-Sachs banking group, which mature Feb. 15.

Consummation of the refinancing will also enable the Goodyear company to increase production, officials state. According to Vice-Presidents G. W. Seiberling and G. M. Stadlerman, the company's business for January showed an increase of slightly more than 50 per cent over December. This is taken to indicate a strong upward trend in the tire industry, as an increase of only 25 per cent over December business had been forecast.

Orders for February and March business are coming in so rapidly, according to Mr. Stadlerman, that as soon as the refinancing is definitely concluded, the company expects to increase production more than 100 per cent, and will go to fully 18,000 tires daily at the earliest possible date. Estimates now place Goodyear production at between 8000 and 8500 tires daily.

Stadlerman is mentioned prominently in industrial and financial circles, as the man who perhaps will succeed to the presidency of the Goodyear company, should there be any change in official personnel in compliance with terms of the refinancing program. It is regarded as not improbable that President F. A. Seiberling, although remaining with the company, will surrender direct control to interests dictated by bankers negotiating the company's loan.

DANIELS FAVORS OIL EMBARGO

WASHINGTON, Feb. 2—Senator Phelan's bill which would authorize the President to embargo petroleum exports has been approved by Secretary of the Navy Daniels. The bill is now before the Senate Naval Committee and it is expected the measure will be reported. Senator Phelan wants immediate action but it is probable appropriation bills will block its early consideration. Exportation of California oil to Japan caused the bill.

Surplus Tire Stocks Show Big Reduction

**Heavy Buying May Cause Spring Shortage, Officials Believe—
January Sales Heavy**

AKRON, Jan. 29—Estimates prepared by rubber manufacturers of Akron indicate that the country will be faced with a tire shortage, possibly by March 1, unless tire production is increased materially at once. Great inroads have been made into the surplus of tires, estimated conservatively at 10,000,000 last September, and actual production of tires now is only one-fourth of consumption, according to estimates prepared by the B. F. Goodrich Co.

Tire production, according to Goodrich estimates, has been at the rate of not more than 8,000,000 tires a year, or about 660,000 a month since last September. Although tire sales are admitted to have slumped, due to the financial depression, business is improving as indicated by the fact that Akron tire factories expect to do more than \$50,000,000 worth of business this month.

Based upon the reports of January business booked by Akron tire companies, and upon the estimates of the Goodrich company that 32,000,000 tires are needed this year to equip the 9,295,252 motor vehicles now in use in America, the monthly demand is 2,000,000 tires in excess of actual production.

Goodrich, by restoring its ten-hour factory shifts, has increased tire production materially this month, while a further increase to a basis of 10,000 tires daily will become effective this week. Goodyear, according to the latest available information, has been manufacturing not to exceed 6500 tires daily. Under conditions of the temporary loan of \$28,300,000 negotiated with Goldman-Sachs Co., New York, which matures Feb. 15, the Goodyear company is precluded from increasing its payroll.

Plenty of Orders on Hand

It is stated authoritatively by Goodyear officials, however, that with negotiations satisfactorily consummated for permanent refinancing to replace the temporary financing program, it will become necessary to increase production in order to keep production apace with present increasing demand. Goodyear has not less than \$15,000,000 worth of business booked for January delivery, while February orders are coming in in an encouraging manner. The increase in production, it is stated, will be accomplished by restoring present factory forces to normal hours, and that additional men will not be employed in the immediate future.

Miller Tire & Rubber Co. is slowing down production somewhat but expects to resume on a basis closely approaching normal, within a few weeks. Miller, which is recognized to be in as sound a financial condition as any rubber com-

pany in Akron, has not felt the tire sale slump or business depression as severely as other companies until this month. The lull in production is merely transitory and is enforced so that present surplus of finished product can be absorbed, Miller officials state.

The open winter has been largely responsible for the present improvement noted in the tire situation. "The possibility of a spring tire shortage is greatly increased by the open winter," state Goodrich officials, "and the surplus existing last fall cannot be counted upon to ward off a shortage when the full buying movement starts."

River Rouge Damages Fixed at \$470,142

DETROIT, Jan. 29—A jury in Federal court hearing the River Rouge condemnation proceedings through which Henry Ford seeks widening the river channel to permit the passage of heavy freight steamers to and from his blast furnaces, handed down a decision this week awarding a total of \$470,142.30 to property owners whose land had been condemned. The warrant is considered a distinct victory for Ford, though the government rather than Ford appeared as plaintiff in the action. However, in view of the fact that Ford was to be the chief beneficiary of the improvement, he agreed to pay all awards and costs of the litigation in the government's behalf and at the outset was compelled to deposit Liberty Bonds and other securities amounting to approximately \$4,000,000 to cover costs and damages that might be assessed as a result of suits by property owners.

It has been more than four years since the War Department advised dredging the Rouge river, and immediately after Congress appropriated money to cover the work property owners began filing suits to prevent the condemnation and carried their case through the Circuit Court of Appeals.

The largest single award was made to the Delray Inland Salt Co. which was given \$73,244.16, although it only asked \$40,000. Other plants were cut down materially in their damage claims. The completion of the River Rouge project is expected by August 1.

FORD WORKS OUT RAIL PLANS

DETROIT, Jan. 28—It has been announced by officials of the Detroit, Toledo & Ironton Railroad, that it is the desire of Henry Ford, who controls the road, that as he is against the idea of working on Sunday, the road will not operate trains on that day. There is no let-up in the plan to put the road on a thoroughly efficient and profitable basis. After the winter months the real big work will begin, although already considerable headway has been made in that direction. For instance, it is stated that a large number of freight cars, formerly used by the road, have been discarded being considered by the experts chosen by Henry Ford as a liability to the road's good operations.

Packard Shuts Down To Balance Stocks

**Shortage of Bodies Due to Strikes
Upsets Schedules—Western
Sales Slump**

DETROIT, Jan. 29—Packard Motor Car Co.'s plant closed at noon to-day for an indefinite period to permit of balancing inventories, according to E. F. Roberts, vice president in charge of manufacturing. Plant officials expressed the hope that conditions would permit of resumption of production in ten days but employees were informed that the maximum period of idleness would be thirty days. More than 3000 men in the factory and many of the employees in the offices were included in the suspension order.

A decided slump in the West following buying activity during the week of the New York show and for a few days thereafter is declared to be in the main responsible for the order, though a strike of body finishers at the Packard plant and also at the plants of two independent concerns which are employed chiefly on Packard work, prevented completion of cars and resulted in other departments getting so far ahead of the body plant as to force cessation of production until the body plant could catch up. The strike began three weeks ago when, according to employees, a cut of 44 cents an hour went into effect.

The following statement was made to-day by Vice President Roberts:

"We are closing today in order to permit balancing our inventories but we hope to resume within the next ten days. At all events the plant will not be closed longer than March 1. Many circumstances have combined to bring about the decision to close, though it is due chiefly to the fact that some of our departments have to run too far ahead of others resulting in greatly unbalanced inventories. Then too there has been a check in the sales mainly in Western territory though there is every indication that that section now is passing through the depression period and in a short time will show signs of reaction and improvement such as has resulted in the East following the recent distinct slump there."

Present Demand Satisfactory

The closing order coming on the heels of reports that Ford would reopen in part Monday was a great surprise though manufacturers were inclined to attribute Packard conditions chiefly to the labor situation in the body plant rather than over-production or lack of demand. Packard has been building about 400 single sixes a month for the last four months. The plant closed for inventory during the holidays but reopened Jan. 3 and had been running steadily since that time. Orders stopping all incoming freight shipments also were sent out today.

Cleveland Puts Over Many Sales at Show

**Attendance Records Indicate
Wide Public Interest—Factory
Representatives Stir Dealers**

CLEVELAND, Jan. 29—Cleveland's twentieth automobile show closed to-day with all attendance records broken by fully 30 per cent and with an encouraging report on both wholesale and retail sales. No actual count of orders is ever made here but there are indications that the aggregate will run at least a little way into the hundreds in retail business alone.

The show received wide and dignified attention from the Cleveland newspapers and brought into town prospects from all of northern Ohio. Dealer meetings, several of them addressed by high factory executives, avoided frills and resulted in a quite satisfactory placing of wholesale orders.

With a wide diversification of industries, Cleveland has not suffered in the readjustment as have some centers but the heavy car registration in Ohio, one to every nine of the population, has created a serious used car problem, which had a good deal to do with preventing sales at the show from attaining even more encouraging totals.

The large attendance at the show was in spite of an increase in the admission fee from 50 to 75 cents.

Baltimore Develops Trade

BALTIMORE, Jan. 31—From a buying standpoint, the automobile show which closed Saturday night probably was 50 per cent as good as that of last year. Firms which did an actual business of eight or ten cars in 1920 and 1919 were well satisfied with four or five last week. There appeared to be more interest in the high-priced cars than in the cheaper ones. The attendance was unusually large but it was obvious that many of those who visited the show were merely sightseers.

Milwaukee Sells 300 Cars

MILWAUKEE, Feb. 1—Informal reports of sales at the Milwaukee show indicate that upwards of 300 cars were sold at retail. Since the close of the show dealers report that business has been of satisfactory volume and much in excess of the pre-show period. Unofficial figures of attendance at the exhibit disclose that approximately 48,000 paid admission. Lists of about 2500 prospective buyers were built up from the show visitors. Distributors in the territory say the show was unusually successful in stirring the dealer and sub-dealer trade.

Addresses at the annual dinner of the Wisconsin Automotive Dealers Association were by Alfred Reeves, manager of the National Automobile Chamber of Commerce; David Beecroft, directing editor of the Class Journal Co., and A. R. Kroh, of Goodyear.

TRAVELING SERVICE TRIED IN ENGLAND

LONDON, Jan. 14.—(*Special Correspondence*).—The Associated Equipment Co. (Inc.) of Walthamstow, London, E., whose fame was largely made by Sam Wallace, production engineer there during the war period, and now chief director of the Wallace truck interests, has started a truck service plan which is making good and earning favor by rapid renovations of A. E. C. trucks when in trouble. The company has six traveling repair shop trucks covering the whole of England and Wales. Each is allotted a territory to tour in, and carries a stock of replacement parts and workshop plant. When a breakdown is reported the district repair truck makes for the spot and the job proceeds until finished. Some record times are reported for such jobs as engine overhauls.

Congressmen Getting Protests of Dealers

(Continued from page 236)

market at Los Angeles and dealers in that city, with the exception of one who is acting as agent for the Slough company, are protesting vigorously to their representatives in Congress in the hope that something may be done to amend the law. The Congressmen view these appeals with much sympathy and believe an injustice is being done to the American truck industry but there is no action they can take as the law stands now. The suggestion has been made, however, that some amendment be proposed. The appeals of individual dealers are being backed by the representative here of the Los Angeles Chamber of Commerce which has gone on record as opposed to the sale of these trucks.

It is understood other chambers of commerce throughout the country will be asked to take similar action and thus arouse sentiment against the purchase of these trucks. As the situation stands at present, it is largely a moral issue and individuals in the market for motor vehicles must decide for themselves whether to buy these rebuilt army trucks from a British company rather than a used vehicle in the same general condition for a little more money.

New York Agents Named

NEW YORK, Feb. 2—Roskam-Scott Co., 1869 Broadway, will represent the Slough Trading Co. in New York. E. I. Roskam, head of the company, said arrangements had been made for the handling of a large quantity of parts, re-shipped to this country by the Slough company, and that a percentage of the truck total would also be handled here. No arrangement had been made for the shipping of any definite number, he said.

Dealers Contracts to Be Considered

**N. A. C. C. Accepts Invitation
From N. A. D. A. for Confer-
ence on Relations**

CHICAGO, Feb. 2—Directors of the National Automobile Chamber of Commerce to-day accepted the invitation of the National Automobile Dealers Association for a joint conference to consider manufacturer and dealer relations, including the question of contracts.

The directors, in a resolution, extended greetings to the dealers association in convention here and referred to the dealers action in inviting the conference as one based on a broad view of the good of the industry.

It is expected that the manufacturers and dealers will appoint their committees in the near future and that the general question of relations between makers and merchandisers of cars and trucks will be taken up.

The traffic committee of the N. A. C. C. reported carload shipments from the factories in January 35 per cent of those in January, 1920.

The Chicago show has gone ahead of that in New York in attendance for the first time in history. The first three days had the largest paid attendance at any national show.

SPRINGFIELD PLANTS ACTIVE

SPRINGFIELD, OHIO, Feb. 2—A. K. Stewart of the Hare's Motors Corp., formerly with the Packard Motor Car Co., has assumed his new duties as manager of the Kelly Springfield Motor Truck Co. Production is gradually increasing at this plant.

All departments at the plant of the Westcott Motor Car Co. resumed operations yesterday on a 50 per cent basis. More men will be added soon, it is announced by General Manager H. G. Root.

REPUBLIC TIRE OUTPUT LOW

YOUNGSTOWN, OHIO, Jan. 29—Operations at the Republic Rubber Co., scheduled to start Jan. 10, were not under way until this week. Cord tire production is on only a small scale. Only the mechanical rubber goods department is working to near full production. The announced eight-hour shift plan has not been put into effect and it is doubtful now whether or not it will be adopted.

MULLINS REDUCES PRODUCTION

SALEM, OHIO, Jan. 29—Production has been almost entirely suspended at the Mullins Body Co., according to officials who assert that they have no definite information as to when work will be resumed. Although a quantity of orders is unfilled, the Mullins company has been notified to withhold shipments.

Efficiency to Bring Wide Use of Trucks

White Sees Greater Trend to Highway Shipping—Time Economy Important

CLEVELAND, Jan. 29—Windsor T. White, president of the White Motor Co., and chairman of the National Motor Truck Committee of the National Automobile Chamber of Commerce, in giving a review of what the motor truck is doing toward transporting freight of the country, says that more than 10,000 regularly established rural motor express lines are in operation and the number is increasing constantly.

The coal situation offers a striking proof of the country's dependency on the motor truck as a means for increasing production, and economical distribution. Of the 4000 coal mines in the country 2000 are without railroad connection. Of the 5000 precious and semi-precious ore mines in the country about 2500 use motor trucks.

At Terre Haute, Ind., coal is being hauled directly from the mines to the consumer. The mines are several miles east of the city and are owned by the coal dealers. Due to the fact that this operation lies within the short haul sphere, the truck was able to cut the delivery time from weeks by railroad to days. The Civic Association of Birmingham, Ala., has contracted with a motor truck corporation to move coal direct from the mines to the consumer at the rate of 200 tons a day.

At such centers as New York, Cincinnati, Minneapolis, Cleveland, St. Louis and Grand Rapids, motor freight terminals have been established. These exercise important influence on transportation and production. In Cincinnati alone 66,000 cars were released for through traffic; shipments that took four days by railroad cars from one part of Cincinnati to another were transferred in four hours by truck.

The conditions of competition for motor transportation at present are different from those which stimulated the rapid increase in the use of trucks during the war. Except for perishable goods, time is the only consideration. The older transportation systems will eventually adjust their facilities to accommodate the traffic for which they are best adapted so that the motor truck must bid for business on the basis of efficiency alone.

OHIO NAMES NEW ENGINEER

YOUNGSTOWN, OHIO, Jan. 29—Ett S. Smith, city service director, becomes State highway engineer Feb. 1, according to announcement from the office of Governor Davis. Smith has been county highway engineer for a number of years until Jan. 1, 1920, when he was named service director. His record has been a distinct improvement of city streets and great advances toward repair of main

thoroughfares that have been "sore spots" for several administrations. He is recognized as one of the leading engineers of the State. He has been an owner and operator of passenger cars and commercial vehicles for several years and is known to look with high favor on the motor vehicle and its large benefits to society. It is believed by automobile men that his efforts will be directed toward building roads that will stand up under modern transportation.

Federal Aid Extension Favored by Congress

WASHINGTON, Jan. 31—The Senate Committee on Post Offices and Post Roads and the House Committee on Good Roads have favorably reported bills amending the Federal Aid act simplifying and extending Government assistance to the States in construction of highways.

The measure sponsored by Senator Phipps of Colorado, provides that the present limit of \$20,000 per mile which may be contributed by the Federal Government should be increased in those States in which the percentage of participation required of the State is decreased under another section of the bill. While this section would not increase the amount of Federal aid, it would allow public land States to avail themselves of their allotments by appropriating a smaller amount of State funds. The Senator announced to-day that he would call it up for early consideration.

Ohio Court to Rule on Bridge Weight Limit

YOUNGSTOWN, OHIO, Jan. 29.—Decision by Judge Cooper in the suit of Albert Buehrle and others, against the county commissioners, seeking permanent injunction against enforcement by the commissioners of stringent regulations restricting weights of loads carried by motor trucks over bridges on main market highways will be made Feb. 5. The plaintiffs introduced evidence showing that there had been a number of arrests of truck operators charged with violating the weight limitations prescribed by the commissioners, a maximum of eight tons gross and as low as five tons gross, including 17 bridges.

The plaintiffs contend that the statute requirements are twelve tons gross and that the commissioners are required to maintain bridges at that loading. The commissioners contend that an act passed some years before motor vehicles were generally used in transportation gave them the right to restrict bridge loading. This act has as its principal feature a restriction "that not more than 40 head of horses or cattle" shall be on a bridge at one time.

C. W. REID DIES

WASHINGTON, Jan. 31—C. W. Reid, manager of the Transportation Bureau of the Federal Highway Council, is dead here after a brief illness.

METAL MARKETS

In all departments of the iron and steel markets stress is being laid on the silver lining which the clouds are beginning to disclose. Resumption of operations by automotive plants that have been shut down was naturally preceded and accompanied by some purchases in the iron, steel and non-ferrous metal markets. Every one interprets what buying has taken place to suit his own particular purposes. A large pig iron interest says: "It appears as though at least one buyer has reached the conclusion that the pig iron market has struck bottom and that the present is as good a time as any to buy for the first half. He has backed this opinion to the extent of 3000 tons for prompt shipment to be stored on the yard for future use, and is inquiring for approximately 10,000 tons of another grade for use over the first half." To which the buyer of a fair-sized tonnage of pig iron, when asked if he was the purchaser alluded to in the foregoing, retorted: "I am not backing any such opinion. In fact, I have no opinion whatsoever to back. But my plant needs pig iron for prompt shipment and I am trying to cover part of our wants over the next six months." Similar conditions are encountered in finished steel. Some of the mills have received modest sheet orders from automotive buyers. From the buyer's point of view, the placing of these orders is not to be interpreted as denoting anything else than that he requires the material and, therefore, is willing to pay the seller's price. If the latter has reached the conclusion that this modest buying indicates that buyers have made up their mind that prices will not go lower, such a deduction is utterly unwarranted. In fact, most buyers, and especially those who are now placing orders for small tonnages, are of the belief that there will be a further downward readjustment in prices. But they believe that it will come gradually and that it can be best and easiest brought about by a resumption of buying on a conservative scale, so that competition between the mills will be encouraged, and those which are really anxious to maintain a fair rate of operations will have an incentive to offer inducements for a corresponding backlog of orders.

Pig Iron—In spite of the ado that some Pittsburgh correspondents make about the coming of a \$30 valley market, the fact is that they are rehashing ancient history. Published quotations notwithstanding, the market has been a \$30 affair ever since Jan. 2. In fact, there have been sales at \$1 and \$2 below that level, but none on a higher basis.

Steel—The largest Chicago district independent is reported to be cutting sheet prices, but Youngstown district rolling mills claim to be maintaining previous quotations. Only a slight improvement is noted in the interest manifested by automotive parts makers in cold finished steel bar offerings. Further reductions are reported in bolts and nuts from the Middle West.

Ferro-Vanadium—The Vanadium Corp. of America has fixed its 1921 price for ferro-vanadium, open hearth grade, at \$5 per pound, contained, base. For low-silicon and low-carbon alloy extras range from \$1.50 to \$2.

Aluminum—Importers have revised their price views upward and appear unwilling to shade 25c., duty paid, for 98 to 99 per cent virgin ingots. The domestic manufacturer's price remains unaltered.

Tin—Rumors that the Federated Malay States Government had reduced the minimum price for Straits tin caused a break followed by speculative ups and downs.

FINANCIAL NOTES

Packard Motor Car Co. inventories, including finished vehicles, show a total of \$16,683,605 as of Nov. 31 last. This compares with \$16,063,189 as of Dec. 31, 1919. Between Sept. 1, 1920, when Packard's fiscal year opened, and Nov. 30 there was an inventory reduction of slightly more than \$1,000,000. In accounts for the year ended Aug. 31, 1920, the company set aside a reserve of \$2,500,000 to offset possible depreciation in inventory values, to be determined from physical inventory as of Dec. 31. Apparently no serious depreciation in value has occurred.

Gillette Motor Products Co. stockholders at a meeting this week voted to increase the capital from \$150,000 to \$300,000. R. N. Gillette, J. D. Stewart, B. H. Carnahan, B. E. Githens and J. A. Golden were named directors. The plant, which manufactures floor and running boards for automobiles and trucks, resumed operations Monday after a shutdown of three months.

H. H. Franklin Mfg. Co. estimates inventory as of Dec. 31 at \$8,160,000, of which \$4,140,000 is work in process and \$4,020,000 stores inventory. This compares with a total of \$6,384,446 as of Dec. 31, 1919. The current inventory shows a big reduction from the peak during the year.

New Castle Rubber Co. schedules in bankruptcy as filed in the United States District Court at Pittsburgh show liabilities of \$3,833,567 and assets of \$745,021.

Kelly-Springfield Tire Co. has had listed on the New York Stock Exchange \$1,250,000 additional common stock, on notice of issuance as a stock dividend.

Eisemann Magneto Corp. paid a regular quarterly dividend of \$1.75 a share on the preferred capital stock of the company Feb. 1.

Studebaker Corp. has declared the regular quarterly dividend of 1½ per cent on preferred and common stocks, payable March 1.

Buckeye Traction Ditcher Co. will increase its capital stock from \$300,000 to \$1,000,000 to provide for increased operation.

Maxwell to Receive
Balance of Claims

DETROIT, Jan. 31—Creditors of the Maxwell Motor Co. holding claims amounting to less than \$5,000 have been ordered to present their claims to Special Master William S. Sayres, Jr., on or before Feb. 15 in the suit of Jenks & Muir Mfg. Co. against Maxwell Motor Co. Inc., a friendly action in which the company joins.

The suit was filed according to Special Master Sayres for the purpose of permitting the reorganization plans to proceed without interruption from the smaller creditors who necessarily would be inclined to file suits, attachments, garnishments, etc., and in fact, would enter into a contest to see which would be first to tie up the company's property. All of the claims above \$5,000 were deposited with the reorganization committee, and the smaller claims will be given hearings by the Special Master and will be settled in full or on an equitable basis, he said.

While the Jenks & Muir action in no

sense involves a receivership, it is in effect the same thing inasmuch as the plant will have to be sold by the Special Master after the hearings, and it is presumed the reorganization committee will be on hand and become buyer of the plant.

Dragon Stock Sales
Banned in Illinois

CHICAGO, Jan. 28—In mandamus proceedings brought in the Sangamon county court under the "blue sky" law by the Dragon Motors Corp., a Chicago company, Judge E. S. Smith upheld the action of Secretary of State Louis A. Emerson in refusing to file the application of the corporation for permission to sell its stock in Illinois.

The company organized to manufacture automobiles had begun an extensive advertising campaign to sell its stock. The value of the assets of the corporation was fixed at \$581,000, a figure obtained, according to the attorneys for the company, by an appraisal on the basis of production of the plant, which was not new, less depreciation.

DUPLEX NAMES NEW OFFICERS

BEAVER DAM, WIS., Jan. 31—The Duplex Storage Battery Co., which moved its works from Milwaukee to Beaver Dam, Wis., several months ago, has reorganized its official personnel and management. The new officers are: President, J. W. Deniger, Beaver Dam; vice-president, Herman L. Schickel, Milwaukee; secretary-treasurer, M. A. Jacobs, Beaver Dam; general manager, Peter M. Kettenhofen; factory superintendent, Joseph Mollerius; directors, John V. Zweck, Beaver Dam, and A. H. Luckenbach, Chicago.

KELLY TRUCK ADDS TO FORCE

SPRINGFIELD, OHIO, Jan. 28—Gradually the force at the Kelly-Springfield Motor Truck Co. plant is being increased. Orders are coming in slowly. With the additional facilities provided not long ago the company is in a position to meet any demands of the trade.

GEORGE HALLEY DIES

LONDON, Jan. 14 (*Special Correspondence*)—The death has occurred this week of George Halley, founder of the well known Glasgow company, makers of Halley trucks. His first vehicles were steamers, but more recently the company concentrated wholly on a 6-cylinder truck which is probably the only "six" truck of British make.

TO ACT ON SLOCUM OFFER

NEWARK, N. J., Feb. 2—Creditors and stockholders of the Slocum, Avram & Slocum Laboratories, Inc., have been directed to show cause on Feb. 14 why the receivers should not accept an offer of \$161,000 for the property of the company exclusive of land, buildings, equipment and accounts receivable.

BANK CREDITS

NEW YORK, Feb. 3—While the week-end bank statements seemed to warrant the predictions for easier money, the local loan market last week showed a firmness which became pronounced on Monday of this week when call money reached 8 per cent. During the last week call money ruled at 7 per cent, as compared with a range of 6 to 7 per cent the week before. There was little activity in the time money market. Demand was light and the supply of loanable money was not plentiful. The single rate of 6½ per cent was quoted for all maturities up to six months until Monday, when a range of 6½ to 7 per cent was established. A uniform rate of 6 per cent was quoted a week ago. Loans secured by all-industrial collateral were quoted at about ¼ of 1 per cent higher.

The Federal Reserve System as a whole continued the improvement which had been taking place in its reserve position during the month of January. The gold reserves increased \$10,368,000, while Federal Reserve notes in circulation declined \$24,562,000. Total bills on hand declined \$29,446,000 and total earning assets \$32,675,000. As a result, the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against net deposits, increased from 55.6 per cent to 56.5 per cent.

The continued rise in sterling and francs was again the feature of the foreign exchange market. Other European exchanges continued to move up sympathetically. Apparently, an expectation of a favorable outcome to the deliberations of the Allied premiers at the Paris Conference was responsible in a large degree for the activity in the foreign exchange.

The stock market was very quiet, with the total turnover for the week at less than 2,700,000 shares. The bond market also was quiet, with indications that the recent rise in prices for high grade securities has received at least a temporary check. This probably is due in part to the flotation of high-coupon-rate foreign securities and the expectation of further similar flotations in the near future. The over-subscription of the Belgium 20-year 8 per cent loan and of the Pennsylvania Railroad 6½s indicates the continued acceptability of such new issues in the investment market.

SEEK GLAMORGAN REFINANCING.

SPRINGFIELD, OHIO, Feb. 2—An effort is to be made by stockholders to reorganize and refinance the Glamorgan Tire & Rubber Co., which has plants at Delphos, Oakhill and Byesville. Fifty stockholders met here this afternoon by order of the United States court at Toledo to determine what they desired to do. A new board of directors was elected to serve with Receiver Arnold V. King. It is stated that the assets amount to \$611,000 and the liabilities are \$650,000, according to the auditor's accounts.

MEN OF THE INDUSTRY

E. A. Taylor, formerly production engineer of the Pierce-Arrow Motor Car Co., has been appointed works manager in charge of production for the Liberty Motor Car Co. Before going with the Pierce-Arrow Co., where he was responsible for plant layout and the installation of progressive assembly as well as criticisms of design from a manufacturing point of view, Taylor was in charge of the manufacturing department of the Cadillac Motor Car Co. for two years and later was in charge of the Maxwell Motor Co.'s plants at Detroit and Dayton. He became general superintendent of the Chalmers plant in 1917 and was in complete charge of important war work in addition to the manufacturing of cars. He joined the Pierce-Arrow organization in 1919.

W. F. Taylor, New York, has been appointed eastern sales director of the Acason Motor Truck Co. Taylor was formerly sales manager for the Federal truck distributor in Philadelphia and later was associated with his brother in handling Signal trucks in New York territory.

D. Minard Shaw has been appointed field representative of the Briscoe Motor Corp. Shaw has been for several years connected with Briscoe distributing interests in the South. He will make his headquarters at Memphis, Tenn.

J. A. Palmer has become sales manager of the Neville More-Room Steering Wheel Co. of Wayne, Mich. He will have charge of sales and advertising. Palmer has been connected with the Burroughs Adding Machine Co.

James N. Gunn, president of the United States Rubber Co., has been elected president of the Lincoln Highway Association, succeeding F. A. Seiberling, president of Goodyear Tire & Rubber Co., who resigned.

Clifford M. Sparks, formerly captain of the University of Michigan football team and who is widely known in athletics, has been placed in charge of sales for the Sparks-Withington Co. at Jackson, Mich.

C. W. Hodges, Galesburg, Mich., has purchased the interest of Henry Lane of Kalamazoo, in the Kalamazoo Chain Co. and the name of the concern has been changed to the Hodges Chain Co. of Galesburg.

Glen D. Hiller, formerly sales manager of the Nelson Motor Truck Co., has been appointed assistant general manager in charge of sales of the Triangle Motor Truck Co., St. Johns, Mich.

Arthur H. Lacey, formerly assistant engineer of the Hall-Scott Motor Car Co. and latterly chief engineer at the Moon Tractor Co., has established a consulting engineering office at Oakland, Cal.

E. G. Edwards, Chicago, for many years associated with George W. Kellogg, founder of the Kellogg Mfg. Co., has been elected to the board of directors of the Wayland Specialty Mfg. Co., Inc.

R. J. Firestone has been elected a vice-president of the United States Motor Truck Co., Cincinnati. Firestone has been connected with the rubber industry for a number of years.

Louis H. Dusenbury has been named vice president, and Harold W. Schwab, secretary, of Louis Dusenbury & Co., Inc., upholstery manufacturers, New York.

A. N. Pollen of London is at the St. Regis Hotel, New York, investigating the local conditions with a view of bringing the Daimler car to this country.

S. L. Warner has resigned as vice-president and general manager of the National Tire & Rubber Co. to join the Robinson Clay Products Co., Akron.

L. A. Brown, formerly district manager for the United States Rubber Co., has been elected president of the Grand Rapids Tire & Rubber Corp.

Omar Wicklin has been appointed assistant western sales manager of the Moon Motor Car Co. and will make his headquarters at Los Angeles.

George W. Copp Co., Inc., has located a new plant at Long Island City for the building of winter tops and automobile bodies.

A. G. Maney and H. L. Franklin have been elected directors of the H. H. Franklin Mfg. Co. and O. A. Lawton has retired.

Andrew J. Pierce Dies; Had Built New Engine

CHICAGO, Jan. 29—Andrew J. Pierce, builder of the old Pierce motor car which was taken over by the J. I. Case T. M. Co. of Racine, died here yesterday of pneumonia. Mr. Pierce was born in Rochester, N. Y., on Jan. 11, 1859, and after working on a newspaper in that city, became associated through the efforts of the owner who perceived his mechanical bent with a well-known machinist in that city. In 1887 he moved to Racine and became connected with the Racine Hardware Co. in charge of the engine production department making an oil engine.

In 1892 he entered into business for himself, manufacturing a gasoline engine of his own invention which was a long step in advance at that time in power machines and organized the Pierce Engine Mfg. Co. After a few years, he established and built a large plant at Lakeside, a suburb of Racine, and formed the Pierce Motor Co. for the manufacture of the Pierce automobile, this being an out-growth of the engine company.

The Pierce company was sold in 1910 to Case who continued to manufacture the Pierce car for two years. A new engine was then adopted and the Pierce name discontinued.

Mr. Pierce was a mechanical engineer, and a designer and manufacturer of gasoline engines. He has been allowed many United States patents on engines which have been used in launches, automobiles and stationary machinery and at the time of his death, had just perfected and obtained letters patent on a new engine for which he claimed great efficiency.

BARLEY NAMES NEW OFFICERS

KALAMAZOO, MICH., Jan. 31—Reports filed at the annual meeting indicate that the Barley Motor Car Co., makers of the Roamer, enjoyed a very prosperous year during 1920. The election of officers resulted in the naming of A. C. Barley, president; C. G. Barley, Marion, Ind., vice-president; C. E. Stephenson, treasurer, and George B. Hopkins, secretary and assistant to President Barley. Hopkins was also added to the board of directors, which includes the officers and M. A. Barley of Kalamazoo and Howard Gould of New York.

INDUSTRIAL NOTES

Security Sales Corp., with offices in New York and Chicago, has been dissolved, but has been granted the privilege of operating within the respective territories as factory branches of the Security Mfg. Co., Los Angeles. Lea J. Orr is in charge of the Chicago office and Marcel J. Orr of the New York branch.

Larco Wrench & Mfg. Corp. has purchased the plant and wrench business of the Cochran Mfg. & Forging Co., 73th Street and Woodlawn Avenue, Chicago. The Cochran company and its forging business is now being operated as the Great Lakes Forge Co., at 119th Street and Racine Avenue.

Cincinnati Milling Machine Co. has bought an interest in the Cincinnati Grinder Co. and will manufacture the latter company's line of machinery. The Grinding company will continue the sales end of the business.

Wharton Motors Co., Inc., Dallas, Texas, is completing the first unit of its plant. It will manufacture a line of cars, trucks and tractors.

Autocar Co. has increased its directorate from seven to nine with the addition of J. Howard Reber and Roscoe T. Anthony.

Block Rubber & Tire Co., Indianapolis, has awarded a contract for the first unit of its new plant estimated to cost \$100,000.

Lincoln Motor Car Co. will continue operations on half-time for several weeks. It reports a gradual increase in orders.

Vim Tractor Co. has purchased the patent rights, patterns, etc., of the Tiger Drill Co., Beaver Dam, Wis.

Mac-Lar Battery Co. assets will be sold at auction on Feb. 14 by the Detroit Truck Co. receiver.

Locomotive Co. has reduced wages at the factory 10 per cent.

MOTOR WHEEL UNITS START

LANSING, MICH., Jan. 28—All units of the Motor Wheel Corp. are in operation this week, the Auto Wheel unit having been started Monday morning, as was also the Gier Pressed Steel plant. The Pruden Wheel unit was started sometime ago, and the southern unit in Tennessee, which produces raw material for the Lansing plants, has been going at full blast for several weeks.

VICTOR ON 300 DAILY BASIS

SPRINGFIELD, OHIO, Jan. 28—Stockholders of the Victor Rubber Co. at the annual meeting yesterday elected directors and heard reports showing that the plant is turning out 300 cord tires daily. The normal output is 500 per day. Directors elected are:—Otto Miller, Alford Smith and W. L. Timmons, Cleveland; H. J. Robben, Cincinnati; F. R. Talbott, C. A. Swinehart and H. H. Durr, Springfield.

PREMIER PRESIDENT DIES

KANSAS CITY, Feb. 2—Dr. L. S. Skelton, president of the Premier Motor Corp. of Indianapolis, died here Saturday after a brief illness.

Calendar

SHOWS

- Feb. 5-12—Minneapolis, Annual Automobile Show, Minneapolis Automobile Trade Ass'n.
- Feb. 7-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.
- Feb. 7-12—St. Louis, Annual Automobile Show, St. Louis Automobile M'frs & Dealers' Ass'n, Robt. E. Lee, Mgr.
- Feb. 12-19—Hartford, Conn., Annual Automobile Show, Hartford Automobile Dealers Ass'n, Armory, Arthur F'foot, Mgr.
- Feb. 12-19—Kansas City, Annual Automobile Show, Kansas City Motor Car Dealers' Ass'n.
- Feb. 14-19—Winnipeg, Western Canada Automotive Equipment Show.
- Feb. 18-28—San Bernardino, Cal., National Orange Show, Fred M. Renfro, Mgr.
- Feb. 19-26—San Francisco, Fifth Annual Pacific Automobile Show, Exposition Auditorium, George Mahlgreen, Mgr.
- Feb. 21-26—Louisville, Annual Automobile Show, Louisville Automobile Dealers

- Ass'n, First Regiment Armory, C. L. Alderson, Sec'y.
- Feb. 21-26—Salt Lake City, Annual Automobile Show, Intermountain Automotive Trades Ass'n, W. D. Rishal, Mgr.
- Feb. 26-Mar. 5—Buffalo, Annual Automobile Dealers Ass'n, 74th Regiment Armory, C. C. Proctor, Mgr.
- Mar. 2-10—Des Moines, Annual Automobile Show, Coliseum, C. G. Van Vliet, Mgr.
- Mar. 5-12—Atlanta, Annual Automobile Show, Atlanta Automobile Dealers' Ass'n, Auditorium, Virgil Shepard, Mgr.
- Mar. 5-12—Brooklyn, Annual Automobile Show, Brooklyn Motor Vehicle Dealers' Ass'n, 23d Regiment Armory, George C. Lewis, chairman.
- Mar. 5-12—Pittsburgh, Annual Automobile Show, Automotive Ass'n, Inc., Motor Square Garden, J. J. Bell, Mgr.
- Mar. 5-12—Atlantic City, Annual Automobile Trade Association of Atlantic City, Million Dollar Pier, A. H. Generatzky, Mgr.

- Mar. 7-12—Syracuse, N. Y., Annual Automobile Show, Syracuse Automobile Dealers Ass'n, Armory, Howard H. Smith, Mgr.
- Mar. 7-12—Indianapolis, Annual Automobile Show, Indianapolis Automotive Trade Ass'n, Automobile Bldg., State Fair Grounds, John Orman, Mgr.
- Mar. 12-19—Boston, Annual Automobile Show, Mechanics Bldg. and South Armory.
- Mar. 14-19—Omaha, Annual Automobile Show, Omaha Automobile Trade Ass'n, Inc., Omaha Auditorium, C. G. Powell, Mgr.
- Mar. 14-19—Washington, Annual Automobile Show, Washington Automobile Dealers' Ass'n, Rudolph Jose, Chmn.
- Mar. 19-26—Detroit, Annual Automobile Show, Detroit Automobile Dealers' Ass'n, Morgan-Wright Building.
- April 4-9—Seattle, Annual Automobile Show, Seattle Motor Car Dealers' Ass'n, Arena Hippodrome.
- April—Chattanooga, Tenn., Spring Automobile Show, Chattanooga Automotive Trade Ass'n, Sunday Tabernacle, C. A. Noone, sec'y.

FOREIGN SHOWS

- Feb. 7—Delhi, India, Delhi Motor Show.
- Mar. 23-28—Witwatersrand Agricultural Show including machinery and motors sections.
- April, 1921—Sofia, Bulgaria, Tractor Trials, under the Bulgarian Ministry of Agriculture.
- May 28-June 8—International Automobile Exhibition, Basle, Switzerland.
- June, 1921—Reykjavik, Iceland, Agricultural Exhibition—Agricultural Machinery—Icelandic Agricultural Society, Reykjavik, Iceland.
- October—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

CONVENTIONS

- May 4-7—Cleveland, National Foreign Trade Council.
- Oct. 12-14, 1921—Chicago, Twenty-Eighth Annual Convention National Implement & Vehicle Ass'n.

Test Highway to Show
Construction Defects

CHICAGO, Jan. 29—A road is being built in Illinois, Federal and State governments co-operating, for the purpose of determining what kind of road to construct to meet present-day traffic conditions. This test road which is well under way now and which will probably be completed early this summer is expected to answer the following questions which are confronting the engineers of to-day:

"What is the economical limit for motor truck loads?

"What is the corresponding limit for the type and thickness of the pavement?"

"What is the load-carrying capacity of the standard types of hard-surfaced pavements of varying thicknesses?"

Clifford Older, chief engineer for the state highway department, believes "that the results obtained will give a definite idea of the value of the different types and thicknesses of pavement for carrying truck loads and also will furnish a basis for deciding how heavy pavements should be built and the limits of the loads which should be carried on them."

PAIGE RECORD AUTHENTICATED

NEW YORK, Jan. 31—The American Automobile Ass'n. has authenticated the record for stock cars established when Ralph Mulford covered a mile straight-away at Daytona in 35.01 seconds in a Paige "6-66" Daytona stock model.

IOWA EXTENDS ROAD WORK

DAVENPORT, IOWA, Jan. 28—Fifteen Iowa counties last year began paving primary roads, according to reports from the highway engineer's office; but

this represented only about a ninth of the program road building forces in the state were ready to undertake.

Forty-five miles of hard-surfaced road were completed and 177 miles contracted for, to be completed this season. Two months ago there were ninety-four projects under way in thirty-two counties and these presented paving of 166 miles, gravelling of 203 miles and grading of 913 miles of highway.

Fiat Enters Three Cars
in French Grand Prix

PARIS, Jan. 15 (*Special Correspondence*)—Fiat has just entered three cars for the French Grand Prix 183 cu. in. race to be run on July 23, probably at Strasbourg. This is the first appearance of the big Italian firm in an open speed contest since 1914. Drivers selected for these cars are Louis Wagner, who frequently raced for Fiat prior to the war, and the two Italians Minoia and Bordino. The two latter have figured up to the present as mechanics.

SPAIN TO SHOW TRACTORS

NEW YORK, Feb. 1—An international exhibition of agricultural machinery, including tractor trials, will be held at Lerida, Spain, April 1-10. All machinery for the exhibition will be exempt from Spanish customs duties and exhibitors desiring information should write to the Comite de Organizacion, Exposicion Internacional de Maquinaria Agricola en Lerida, Urgel 187, Barcelona, Spain. The tractor trials will include a four-hour plowing competition, the minimum depth of furrows to be 20 centimeters.

Pennsylvania University
Starts Highway Course

PHILADELPHIA, Jan. 31—State, municipal and private engineers have just begun attendance at a special course in highway engineering opened at the University of Pennsylvania. To qualify for the course, the men must have either a degree in engineering, or experienced in highway work.

The class started with seventy-eight members. Included in the number are thirty-six from the Pennsylvania State Highway Bureau, ten from the New York State Highway Bureau, six from the Delaware State Highway Bureau and ten from New England. The men taking the course average from thirty to forty years of age. The course, under the direction of Prof. Milo S. Ketchum, of the civil engineering department of the University, includes among its lecturers many of the most famous road builders of the country. In this connection, on Feb. 7, there will be a conference of highway engineers.

NEW ZEALAND PLANS AIR MAIL

NEW YORK, Jan. 29—New Zealand will establish airplane mail routes along lines proven to be practical by the United States Post Office Department, according to J. B. Murphy, of Timarou, who is in New York. He is interested in an aircraft operating company in Timarou and came to New York for a demonstration of the ten-passenger Liberty-engined Curtiss "Eagle," with a view to utilizing it in a tourist sight-seeing service over Mt. Cook. The government is also encouraging civilian aeronautics by the enactment of laws and establishing landing fields.